Appendix A
32 Point Groups: Notations, Symmetry Elements, Crystalline Classes, Group Orders, Subgroups, and Supergroups

Table A.1 Stroganov's table for 32 point groups

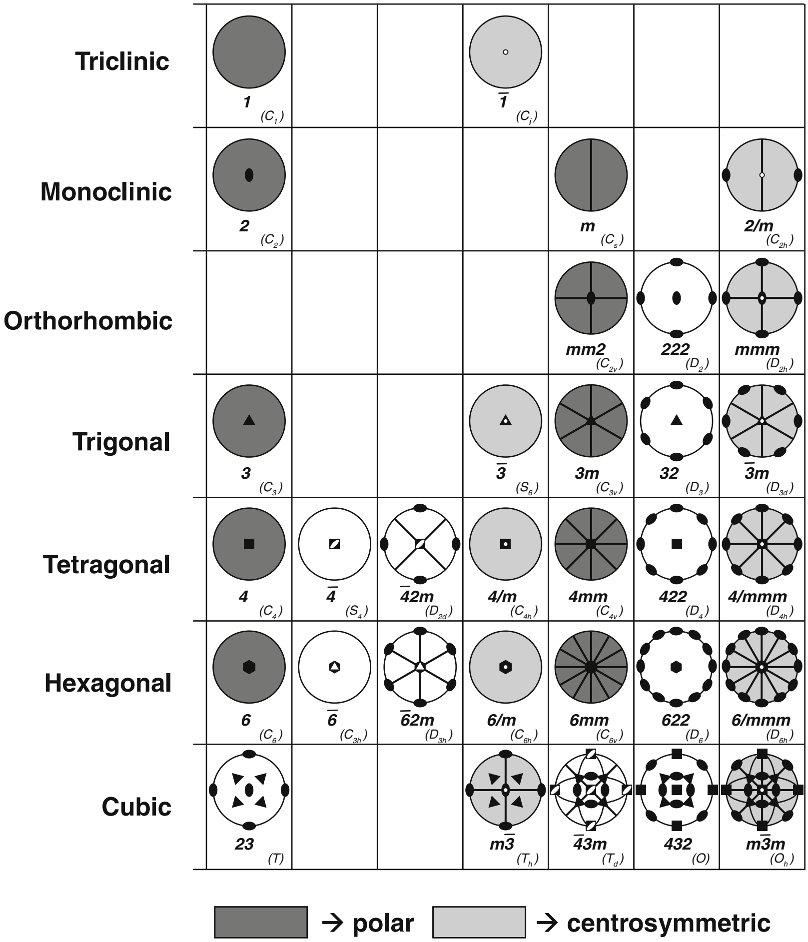

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Table A.2 Group orders, subgroups, and supergroups among the 32 point groups

$m\bar{3}m$	48	*																															
$\bar{4}3m$	24	×	*																														
432	24	×		*																													
$m\bar{3}$	24	×			*																												
23	12	×	×	×	×	*																											
$6/mmm$	24						*																										
$\bar{6}m2$	12						×	*																									
$6mm$	12						×		*																								
622	12						×	×		*																							
$6/m$	12						×				*																						
$\bar{6}$	6						×	×			×	*																					
6	6						×		×	×	×		*																				
$\bar{3}m$	12	×					×							*																			
$3m$	6	×	×				×	×	×					×	*																		
32	6	×		×			×	×	×		×			×		*																	
$\bar{3}$	6	×	×		×		×					×		×			*																
3	3	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	*															
$4/mmm$	16	×																	*														
$\bar{4}2m$	8	×	×																×	*													
$4mm$	8	×																	×		*												
422	8	×		×															×			*											
$4/m$	8	×																	×				*										
$\bar{4}$	4	×	×																×	×			×	*									
4	4	×		×															×		×	×	×		*								
mmm	8	×			×		×												×							*							
$mm2$	4	×	×		×		×	×	×										×	×	×					×	*						
222	4	×	×	×	×	×	×			×									×	×		×				×		*					
$2/m$	4	×			×		×				×			×					×				×			×			*				
m	2	×	×		×		×	×	×		×	×		×	×				×	×	×		×			×	×		×	*			
2	2	×	×	×	×	×	×	×	×	×	×		×	×		×			×	×	×	×	×	×	×	×	×	×	×		*		
$\bar{1}$	2	×			×		×				×			×			×		×				×			×			×			*	
1	1	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	*

The second column gives the order of the group. The asterisk at the top of each vertical column indicates the supergroup. The ×'s vertically below it indicate the subgroups which belong to this supergroup. Adapted from Bloss (1971).

Appendix B
Ferroic Species

Table B.1 Ferroic species

1 Species no.	2 Species designation	3 n_F	4 q	5 q_P	6 q_ε	7 q_d	8 q_s	9
001	$m\bar{3}m - d - \bar{4}3m$	1	2	0	1	2	1	
002	$m\bar{3}m - 432$	1	2	0	1	0	1	$\varepsilon[V^2]$
003	$m\bar{3}m - m3$	1	2	0	1	0	1	$\{V^2V^2\}$
004	$m\bar{3}m - d - 23$	1	4	0	1	2	1	RR
005	$m\bar{3}m - \varepsilon s - \bar{3}_{xyz}m_{\bar{x}y}$	4	4	0	4	0	4	
006	$m\bar{3}m - P\varepsilon ds - 3_{xyz}m_{\bar{x}y}$	4	8	8	4	8	4	
007	$m\bar{3}m - \varepsilon ds - 3_{xyz}2_{\bar{x}y}$	4	8	0	4	8	4	
008	$m\bar{3}m - \varepsilon s - \bar{3}_{xyz}$	4	8	0	4	0	8	
009	$m\bar{3}m - Pds - 3xyz$	4	16	8	4	16	8	RR
010	$m\bar{3}m - \varepsilon s - 4_z/m_xm_ym_z$	3	3	0	3	0	3	
011	$m\bar{3}m - \varepsilon ds - \bar{4}_z2_{xy}m_x$	3	6	0	3	6	3	1
012	$m\bar{3}m - \varepsilon ds - \bar{4}_z2_xm_{xy}$	3	6	0	3	6	3	1
013	$m\bar{3}m - P\varepsilon ds - 4_zm_xm_{xy}$	3	6	6	3	6	3	
014	$m\bar{3}m - \varepsilon ds - 4_z2_x2_{xy}$	3	6	0	3	6	3	
015	$m\bar{3}m{-}\varepsilon s{-}4_z/m_z$	3	6	0	3	0	6	
016	$m\bar{3}m - \varepsilon ds - \bar{4}$	3	12	0	3	12	6	RR
017	$m\bar{3}m - P\varepsilon ds - 4$	3	12	6	3	12	6	
018	$m\bar{3}m - \varepsilon s - m_xm_ym_z$	1	6	0	6	0	6	
019	$m\bar{3}m - \varepsilon s - m_{xy}m_{\bar{x}y}m_z$	3	6	0	6	0	6	
020	$m\bar{3}m - P\varepsilon ds - m_xm_y2_z$	3	12	6	6	12	6	
021	$m\bar{3}m - P\varepsilon ds - m_{xy}m_{\bar{x}y}2_z$	3	12	6	6	12	6	RR
022	$m\bar{3}m - P\varepsilon ds - m_{\bar{x}y}m_z2_{xy}$	6	12	12	6	12	6	RR
023	$m\bar{3}m - \varepsilon ds - 2_x2_y2_z$	1	12	0	6	12	6	
024	$m\bar{3}m - \varepsilon ds - 2_{xy}2_{\bar{x}y}2_z$	3	12	0	6	12	6	RR
025	$m\bar{3}m - \varepsilon s - 2_{xy}/m_{xy}$	6	12	0	12	0	12	2 IRs
026	$m\bar{3}m - \varepsilon s - 2_z/m_z$	3	12	0	12	0	12	RR
027	$m\bar{3}m - P\varepsilon ds - m_z$	3	24	24	12	24	12	2 IRs
028	$m\bar{3}m - P\varepsilon ds - m_{xy}$	6	24	24	12	24	12	
029	$m\bar{3}m - P\varepsilon ds - 2_{xy}$	6	24	12	12	24	12	
030	$m\bar{3}m - P\varepsilon ds - 2_z$	3	24	6	12	24	12	RR
031	$m\bar{3}m - \varepsilon s - \bar{1}$	1	24	0	24	0	24	2 IRs
032	$m\bar{3}m - P\varepsilon ds - 1$	1	48	48	24	24	24	2 IRs

Table B.1 (continued)

1 Species no.	2 Species designation	3 n_{F}	4 q	5 q_{P}	6 q_{ε}	7 q_{d}	8 q_{s}	9
033	$\bar{4}3m - 23$	1	2	0	1	1	1	$\varepsilon[V^2]$
034	$\bar{4}3m - P\varepsilon ds - 3_{xyz}m_{\bar{x}y}$	4	4	4	4	4	4	
035	$\bar{4}3m - P\varepsilon ds - 3_{xyz}$	4	8	4	4	4	8	
036	$\bar{4}3m - \varepsilon ds - \bar{4}_z 2_x m_{xy}$	3	3	0	3	3	3	
037	$\bar{4}3m - \varepsilon ds - \bar{4}_z$	3	6	0	3	6	6	
038	$\bar{4}3m - P\varepsilon ds - m_{xy}m_{\bar{x}y}2_z$	3	6	6	6	6	6	
039	$\bar{4}3m - \varepsilon ds - 222$	1	6	0	6	6	6	
040	$\bar{4}3m - P\varepsilon ds - m_{xy}$	6	12	12	12	12	12	2 IRs
041	$\bar{4}3m - P\varepsilon ds - 2_z$	3	12	6	12	12	12	RR
042	$\bar{4}3m - P\varepsilon ds - 1$	1	24	24	24	24	24	2 IRs
043	$432{-}d{-}23$	1	2	0	1	2	1	
044	$432 - \varepsilon ds - 3_{xyz}2_{\bar{x}y}$	4	4	0	4	4	4	
045	$432{-}P\varepsilon ds{-}3_{xyz}$	4	8	8	4	8	8	
046	$432{-}\varepsilon ds{-}4_z 2_x 2_{xy}$	3	3	0	3	3	3	
047	$432{-}P\varepsilon ds{-}4_z$	3	6	6	3	6	6	
048	$432{-}\varepsilon ds{-}2_x 2_y 2_z$	1	6	0	6	6	6	
049	$432 - \varepsilon ds - 2_{xy}2_{\bar{x}y}2_z$	3	6	0	6	6	6	
050	$432{-}P\varepsilon d\mathrm{s}{-}2_{xy}$	6	12	12	12	12	12	
051	$432{-}P\varepsilon ds{-}2_z$	3	12	6	12	12	12	RR
052	$432{-}P\varepsilon ds{-}1$	1	24	24	24	24	24	2 IRs
053	$m\bar{3} - d - 23$	1	2	0	1	2	1	
054	$m\bar{3} - \varepsilon s - \bar{3}_{xyz}$	4	4	0	4	0	4	
055	$m\bar{3} - P\varepsilon ds - 3_{xyz}$	4	8	8	4	8	4	
056	$m\bar{3} - \varepsilon s - mmm$	1	3	0	3	0	3	
057	$m\bar{3} - P\varepsilon ds - m_x m_y 2_z$	3	6	6	3	6	3	
058	$m\bar{3} - \varepsilon ds - 222$	1	6	0	3	6	3	
059	$m\bar{3} - \varepsilon s - 2_z/m_z$	3	6	0	6	0	6	
060	$m\bar{3} - P\varepsilon ds - m_z$	3	12	12	6	12	6	
061	$m\bar{3} - P\varepsilon ds - 2_z$	3	12	6	6	12	6	RR
062	$m\bar{3} - s - \bar{1}$	1	12	0	12	0	12	
063	$m\bar{3} - P\varepsilon ds - 1$	1	24	24	12	24	12	
064	$23{-}P\varepsilon ds{-}3_{xyz}$	4	4	4	4	4	4	
065	$23{-}\varepsilon ds{-}222$	1	3	0	3	3	3	
066	$23{-}P\varepsilon ds{-}2$	3	6	6	6	6	6	
067	$23{-}P\varepsilon ds{-}1$	1	12	12	12	12	12	
068	$6/mmm - d - \bar{6}_z m_y 2_x$	1	2	0	1	2	1	
	$6/mmm - d - \bar{6}_z m_x 2_y$							
069	$6/mmm{-}Pd{-}6mm$	1	2	2	1	2	1	
070	$6/mmm{-}d{-}622$	1	2	0	1	2	1	
071	$6/mmm{-}6/m$	1	2	0	1	2	1	$\varepsilon V[V^2]$
072	$6/mmm - d - \bar{6}$	1	4	0	1	4	1	RR
073	$6/mmm{-}Pd{-}6$	1	4	2	1	4	1	RR
074	$6/mmm - s - \bar{3}_z m_x$	1	2	0	1	2	2	
	$6/mmm - s - \bar{3}_z m_y$							
075	$6/mmm - Pds - 3_z m_x$	1	4	2	1	4	2	RR
	$6/mmm - Pds - 3_z m_y$							

Table B.1 (continued)

1 Species no.	2 Species designation	3 n_F	4 q	5 q_P	6 q_ε	7 q_d	8 q_s	9
076	$6/mmm - ds - 3_z2_x$ $6/mmm - ds - 3_z2_y$	1	4	0	1	4	2	RR
077	$6/mmm - s - \bar{3}$	1	4	0	1	0	4	RR
078	$6/mmm{-}Pds{-}3$	1	8	2	1	8	4	RR
079	$6/mmm - \varepsilon s - m_xm_ym_z$	3	3	0	3	3	3	
080	$6/mmm - P\varepsilon ds - m_xm_y2_z$	3	6	2	3	6	3	
081	$6/mmm - P\varepsilon ds - m_xm_z2_y$ $6/mmm - P\varepsilon ds - m_ym_z2_x$	3	6	6	3	6	3	
082	$6/mmm{-}\varepsilon ds{-}222$	3	6	0	3	6	3	
083	$6/mmm - \varepsilon s - 2_x/m_x$ $6/mmm - \varepsilon s - 2_y/m_y$	3	6	0	6	0	6	
084	$6/mmm{-}\varepsilon s{-}2_z/m_z$	1	6	0	6	0	6	
085	$6/mmm{-}P\varepsilon ds{-}m_x$ $6/mmm{-}P\varepsilon ds{-}m_y$	3	12	12	6	12	6	RR
086	$6/mmm{-}P\varepsilon ds{-}m_z$	1	12	12	6	12	6	
087	$6/mmm - P\varepsilon ds - 2_x$ $6/mmm - P\varepsilon ds - 2_y$	3	12	6	6	12	6	RR
088	$6/mmm{-}P\varepsilon ds{-}2_z$	1	12	2	6	12	6	
089	$6/mmm - s - \bar{1}$	1	12	0	12	0	12	
090	$6/mmm{-}P\varepsilon ds{-}1$	1	24	24	12	24	12	RR
091	$\bar{6}m2 - d - \bar{6}$	1	2	0	1	2	1	
092	$\bar{6}m2 - Pds - 3m$	1	2	2	1	2	2	
093	$\bar{6}m2 - ds - 32$	1	2	0	1	2	2	
094	$\bar{6}m2 - Pds - 3$	1	4	2	1	4	4	RR
095	$\bar{6}m2 - P\varepsilon ds - m_xm_z2_y$	3	3	3	3	3	3	
096	$\bar{6}m2 - P\varepsilon ds - m_z$	1	6	6	6	6	6	
097	$\bar{6}m2 - P\varepsilon ds - m_x$	3	6	6	6	6	6	
098	$\bar{6}m2 - P\varepsilon ds - 2y$	3	6	3	6	6	6	
099	$\bar{6}m2 - P\varepsilon ds - 1$	1	12	12	12	12	12	
100	$6mm{-}d{-}6$	1	2	1	1	2	1	
101	$6mm{-}ds{-}3_zm_x$ $6mm{-}ds{-}3_zm_y$	1	2	1	1	2	2	
102	$6mm{-}ds{-}3$	1	4	1	1	4	4	RR
103	$6mm{-}\varepsilon ds{-}m_xm_y2_z$	3	3	1	3	3	3	
104	$6\,mm - P\varepsilon ds - m_x$ $6\,mm - P\varepsilon ds - m_y$	3	6	6	6	6	6	
105	$6mm{-}\varepsilon ds{-}2_z$	1	6	1	6	6	6	
106	$6mm{-}P\varepsilon ds{-}1$	1	12	12	12	12	12	
107	$622{-}Pd{-}6$	1	2	2	1	2	1	
108	$622{-}ds{-}3_z2_x$ $622{-}{-}ds{-}3_z2_y$	1	2	0	1	2	2	
109	$622{-}Pds{-}3$	1	4	2	1	4	4	RR
110	$622{-}\varepsilon ds{-}2_x2_y2_z$	3	3	0	3	3	3	
111	$622 - P\varepsilon ds - 2_x$ $622 - P\varepsilon ds - 2_y$	3	6	6	6	6	6	
112	$622{-}P\varepsilon ds{-}2_z$	1	6	2	6	6	6	

Table B.1 (continued)

1 Species no.	2 Species designation	3 n_F	4 q	5 q_P	6 q_ε	7 q_d	8 q_s	9
113	$622{-}P\varepsilon ds{-}1$	1	12	12	12	12	12	
114	$6/m-d-\bar{6}$	1	2	0	1	2	1	
115	$6/m{-}Pd{-}6$	1	2	2	1	2	1	
116	$6/m-s-\bar{3}$	1	2	0	1	0	2	
117	$6/m{-}Pds{-}3$	1	4	2	1	4	2	RR
118	$6/m{-}\varepsilon s{-}2/m$	1	3	0	3	0	3	
119	$6/m{-}P\varepsilon ds{-}m$	1	6	6	3	6	3	
120	$6/m{-}P\varepsilon ds{-}2$	1	6	2	3	6	3	
121	$6/m-\varepsilon s-\bar{1}$	1	6	0	6	0	6	
122	$6/m{-}P\varepsilon ds{-}1$	1	12	12	6	12	12	RR
123	$\bar{6}-Pds-3$	1	2	2	1	2	2	
124	$\bar{6}-P\varepsilon ds-m$	1	3	3	3	3	3	
125	$\bar{6}-P\varepsilon ds-1$	1	6	6	6	6	6	
126	$6{-}ds{-}3$	1	2	1	1	2	2	
127	$6{-}\varepsilon ds{-}2$	1	3	1	3	3	3	
128	$6{-}P\varepsilon ds{-}1$	1	6	6	6	6	6	
129	$\bar{3}m-Pd-3m$	1	2	2	1	2	1	
130	$\bar{3}m-d-32$	1	2	0	1	2	1	
131	$\bar{3}m-s-\bar{3}$	1	2	0	1	0	2	
132	$\bar{3}m-Pds-3$	1	4	2	1	4	2	RR
133	$\bar{3}m-\varepsilon s-2/m$	3	3	0	3	0	3	
134	$\bar{3}m-P\varepsilon ds-m$	3	6	6	3	6	3	
135	$\bar{3}m-P\varepsilon ds-2$	3	6	6	3	6	3	
136	$\bar{3}m-\varepsilon s-\bar{1}$	1	6	0	6	0	6	
137	$\bar{3}m-P\varepsilon ds-1$	1	12	12	6	12	6	
138	$3m{-}d\mathrm{s}{-}3$	1	2	1	1	2	2	
139	$3m{-}P\varepsilon ds{-}m$	3	3	3	3	3	3	
140	$3m{-}P\varepsilon ds{-}1$	1	6	6	6	6	6	
141	$32{-}Pds{-}3$	1	2	2	1	2	2	
142	$32{-}P\varepsilon ds{-}2$	3	3	3	3	3	3	
143	$32{-}P\varepsilon ds{-}1$	1	6	6	6	6	6	
144	$\bar{3}-Pd-3$	1	2	2	1	2	1	
145	$\bar{3}-\varepsilon s-\bar{1}$	1	3	0	3	0	3	
146	$\bar{3}-P\varepsilon ds-1$	1	6	6	3	6	3	
147	$3{-}P\varepsilon ds{-}1$	1	3	3	3	3	3	
148	$4/mmm-d-\bar{4}_z 2_x m_{xy}$ $4/mmm-d-\bar{4}_z 2_{xy} m_x$	1	2	0	1	2	1	
149	$4/mmm{-}Pd{-}4mm$	1	2	2	1	2	1	
150	$4/mmm{-}d{-}422$	1	2	0	1	2	1	
151	$4/mmm{-}s{-}4/m$	1	2	0	1	0	2	
152	$4/mmm-ds-\bar{4}$	1	4	0	1	4	2	RR
153	$4/mmm{-}Pds{-}4$	1	4	2	1	4	2	RR
154	$4/mmm-\varepsilon s-m_x m_y m_z$ $4/mmm-\varepsilon s-m_{xy} m_{\bar{x}y} m_z$	1	2	0	2	0	2	
155	$4/mmm{-}P\varepsilon ds{-}m_y m_z 2_x$ $4/mmm-P\varepsilon ds-m_{\bar{x}y} m_z 2_{xy}$	2	4	4	2	4	2	

Table B.1 (continued)

1 Species no.	2 Species designation	3 n_F	4 q	5 q_P	6 q_ε	7 q_d	8 q_s	9
156	$4/mmm{-}P\varepsilon ds{-}m_x m_y 2_z$	1	4	2	2	4	2	RR
	$4/mmm - P\varepsilon ds - m_{xy} m_{\bar{x}y} 2_z$							
157	$4/mmm - \varepsilon ds - 2_x 2_y 2_z$	1	4	0	2	4	2	RR
	$4/mmm - \varepsilon ds - 2_{xy} 2_{\bar{x}y} 2_z$							
158	$4/mmm - \varepsilon s - 2_x/m_x$	2	4	0	4	0	4	
	$4/mmm - \varepsilon s - 2_{xy}/m_{xy}$							
159	$4/mmm{-}\varepsilon s{-}2_z/m_z$	1	4	0	4	0	4	RR
160	$4/mmm - P\varepsilon ds - m_x$	2	8	8	4	8	4	RR
	$4/mmm - P\varepsilon ds - m_{xy}$							
161	$4/mmm{-}P\varepsilon ds{-}m_z$	1	8	8	4	8	4	
162	$4/mmm - P\varepsilon ds - 2_x$	2	8	4	4	8	4	RR
	$4/mmm - P\varepsilon ds - 2_{xy}$							RR
163	$4/mmm{-}P\varepsilon ds{-}2_z$	1	8	2	4	8	4	RR
164	$4/mmm - \varepsilon s - \bar{1}$	1	8	0	8	0	8	
165	$4/mmm{-}P\varepsilon ds{-}1$	1	16	16	8	16	8	RR
166	$\bar{4}2m - ds - \bar{4}$	1	2	0	1	2	2	
167	$\bar{4}2m - P\varepsilon ds - mm2$	1	2	2	2	2	2	
168	$\bar{4}2m - \varepsilon ds - 222$	1	2	0	2	2	2	
169	$\bar{4}2m - P\varepsilon ds - m_{xy}$	2	4	4	4	4	4	
170	$\bar{4}2m - P\varepsilon ds - 2_x$	2	4	4	4	4	4	
171	$\bar{4}2m - P\varepsilon ds - 2_z$	1	4	2	4	4	4	RR
172	$\bar{4}2m - P\varepsilon ds - 1$	1	8	8	8	8	8	
173	$4mm{-}ds{-}4$	1	2	1	1	2	2	
174	$4mm - \varepsilon ds - m_x m_y 2_z$	1	2	1	2	2	2	
	$4mm - \varepsilon ds - m_{xy} m_{\bar{x}y} 2_z$							
175	$4mm - P\varepsilon ds - m_x$	2	4	4	4	4	4	
	$4mm - P\varepsilon ds - m_{xy}$							
176	$4mm{-}\varepsilon ds{-}2$	1	4	1	4	4	4	RR
177	$4mm{-}P\varepsilon ds{-}1$	1	8	8	8	8	8	
178	$422{-}Pds{-}4$	1	2	2	1	2	2	
179	$422 - \varepsilon ds - 2_x 2_y 2_z$	1	2	0	2	2	2	
	$422 - \varepsilon ds - 2_{xy} 2_{\bar{x}y} 2_z$							
180	$422 - P\varepsilon ds - 2_x$	2	4	4	4	4	4	
	$422 - P\varepsilon ds - 2_{xy}$							
181	$422{-}P\varepsilon ds{-}2_z$	1	4	2	4	4	4	RR
182	$422{-}P\varepsilon ds{-}1$	1	8	8	8	8	8	
183	$4/m - d - \bar{4}$	1	2	0	1	2	1	
184	$4/m{-}Pd{-}4$	1	2	2	1	2	1	
185	$4/m{-}\varepsilon s{-}2/m$	1	2	0	2	0	2	
186	$4/m{-}P\varepsilon ds{-}m$	1	4	4	2	4	2	
187	$4/m{-}P\varepsilon ds{-}2$	1	4	2	2	4	2	RR
188	$4/m{-}\varepsilon s{-}\bar{1}$	1	4	0	4	0	4	
189	$4/m{-}P\varepsilon ds{-}1$	1	8	8	4	8	4	RR
190	$\bar{4} - P\varepsilon ds - 2$	1	2	2	2	2	2	
191	$\bar{4} - P\varepsilon ds - 1$	1	4	4	4	4	4	
192	$4{-}\varepsilon ds{-}2$	1	2	1	2	2	2	

Table B.1 (continued)

1 Species no.	2 Species designation	3 n_F	4 q	5 q_P	6 q_ε	7 q_d	8 q_s	9
193	$4{-}P\varepsilon ds{-}1$	1	4	4	4	4	4	
194	$mmm - Pd - m_x m_y 2_z$ $mmm - Pd - m_x m_z 2_y$ $mmm - Pd - m_y m_z 2_x$	1	2	2	1	2	1	
195	$mmm - d - 222$	1	2	0	1	2	1	
196	$mmm - \varepsilon s - 2_x/m_z$ $mmm - \varepsilon s - 2_y/m_y$ $mmm - \varepsilon s - 2_z/m_x$	1	2	0	2	0	2	
197	$mmm - P\varepsilon ds - m_x$ $mmm - P\varepsilon ds - m_y$ $mmm - P\varepsilon ds - m_z$	1	4	4	2	4	2	RR
198	$mmm - P\varepsilon ds - 2_x$ $mmm - P\varepsilon ds - 2_y$ $mmm - P\varepsilon ds - 2_z$	1	4	2	2	4	2	RR
199	$mmm - \varepsilon s - \bar{1}$	1	4	0	4	0	4	RR
200	$mmm - P\varepsilon ds - 1$	1	8	8	4	8	4	RR
201	$mm2 - P\varepsilon ds - m_x$ $mm2 - P\varepsilon ds - m_y$	1	2	2	2	2	2	
202	$mm2 - \varepsilon ds - 2$	1	2	1	2	2	2	
203	$mm2 - P\varepsilon ds - 1$	1	4	4	4	4	4	RR
204	$222{-}P\varepsilon ds{-}2_x$ $222{-}P\varepsilon ds{-}2_y$ $222{-}P\varepsilon ds{-}2_z$	1	2	2	2	2	2	
205	$222 - P\varepsilon ds - 1$	1	4	4	4	4	4	RR
206	$2/m - Pd - m$	1	2	2	1	2	1	
207	$2/m - Pd - 2$	1	2	2	1	2	1	
208	$2/m - \varepsilon s - \bar{1}$	1	2	0	2	0	2	
209	$2/m - P\varepsilon ds - 1$	1	4	4	2	4	2	RR
210	$m - P\varepsilon ds - 1$	1	2	2	2	2	2	
211	$2 - P\varepsilon ds - 1$	1	2	2	2	2	2	
212	$\bar{1} - Pd - 1$	1	2	2	1	2	1	

Column 1: sequential number of the species. *Column 2*: symbol of the species. *Column 3*: number of equivalent subgroups *F*. *Column 4*: total number of domain states. *Column 5*: number of ferroelectric domain states. Here 0 means that *F* is nonpolar while 1 means that *F* is pyroelectric with only one orientation of P_S (or better to say, of the pyroelectric coefficient). *Column 6*: number of ferroelastic domain states. Number 1 means that *F* is nonferroelastic. *Column 7*: number q_d of domain states differing in the piezoelectric tensor or, more generally, in the tensor of symmetry $V[V^2]$ or $[V^2]V$. Here number 0 means that *F* is not piezoelectric while 1 means that *F* is piezoelectric but has no new components of the appropriate tensor. *Column 8*: number of ferrobielastic domain states. Here 1 means that the compliance matrix has no new components in the distorted phase. *Column 9*: the lowest order tensor in which some domain states are distinguished for higher order ferroics; symbols "2 IRs" and "RR" indicate that the transition is induced by two different irreducible representations or by a reducible representation, respectively

Appendix C
Phase Transitions into Ferroelectric Phases

Table C.1 Phase transitions into ferroelectric phases

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
Cubic parent phase					$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{xx}, 0, 0, 0$		
006	$m\bar{3}m - P\varepsilon ds - 3_{xyz}m_{\bar{x}y}$	8	$P_x = P_y = P_z$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \varepsilon_{yz}, \varepsilon_{yz}, \varepsilon_{yz}$	4	$m3m(4)D3F3m=$
009	$m\bar{3}m - P\varepsilon ds - 3_{xyz}$	16	$[P_x = P_y = P_z]$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \varepsilon_{yz}, \varepsilon_{yz}, \varepsilon_{yz}$	4	$*m3m(4)D3F3=$
013	$m\bar{3}m - P\varepsilon ds - 4_z m_x m_{xy}$	6	P_z	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	3	$m3m(3)D4F4mm=$
017	$m\bar{3}m - P\varepsilon ds - 4_z$	12	$[P_z]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	3	$*m3m(3)D4F4=$
020	$m\bar{3}m - P\varepsilon ds - m_x m_y 2_z$	12	$[P_z]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$	6	$*m3m(3)D2Fmm2\neq$
021	$m\bar{3}m - P\varepsilon ds - m_{xy}m_{\bar{x}y}2_z$	12	$[P_z]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$*m3m(3)D2Fmm2\neq$
022	$m\bar{3}m - P\varepsilon ds - m_{\bar{x}y}m_z 2_{xy}$	12	$P_x = P_y\ (P_x = P_y)$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$m3m(6)D2Fmm2=$
027	$m\bar{3}m - P\varepsilon ds - m_z$	24	$P_x, P_y\ (P_x, P_y)$	24	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	12	$m3m(12)A4Fm=$
028	$m\bar{3}m - P\varepsilon ds - m_{xy}$	24	$P_x = -P_y, P_z$	24	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$	12	$m3m(12)A^*2Fm=$
029	$m\bar{3}m - P\varepsilon ds - 2_{xy}$	24	$(P_y = P_x)$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$	12	$*m3m(3)D2F2\neq$
030	$\bar{3}m - P\varepsilon ds - 2_z$	24	$[P_z]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	12	$*m3m(3)D4F2\neq$
032	$m\bar{3}m - P\varepsilon ds - 1$	48	P_x, P_y, P_z (P_x, P_y, P_z)	48	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	24	$*m3m(24)A1F1=$
034	$3m - P\varepsilon ds - 3_{xyz}m_{\bar{x}y}$	4	$P_x = P_y = P_z$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \varepsilon_{yz}, \varepsilon_{yz}, \varepsilon_{yz}$	4	$\bar{4}3m(4/2)D3F3m$
035	$\bar{4}3m - P\varepsilon ds - 3_{xyz}m_{\bar{x}y}$	8	$(P_x = P_y = P_z)$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \varepsilon_{yz}, \varepsilon_{yz}, \varepsilon_{yz}$	4	$*\bar{4}3m(4/2)D3F3$
038	$\bar{4}3m - P\varepsilon ds - m_{xyz}m_{\bar{x}y}2z$	6	P_z	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$\bar{4}3m(3)D\bar{4}Fmm2\neq$
040	$\bar{4}3m - P\varepsilon ds - m_{xy}$	12	$P_x = P_y, P_z$ $(P_x = P_y, P_z)$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$	12	$\bar{4}3m(12/2)AmFm$
041	$\bar{4}3m - P\varepsilon ds - 2_z$	12	$[P_z]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	12	$*\bar{4}3m(6/2)D\bar{4}F2$

Table C.1 (continued)

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
042	$\bar{4}3m - P\varepsilon ds - 1$	24	P_x, P_y, P_z (P_x,P_y,P_z)	24	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	24	$\bar{4}3m(24/2)A1F1$
045	$432{-}P\varepsilon ds{-}3_{xyyz}$	8	$P_x = P_y = P_z$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \varepsilon_{yz}, \varepsilon_{yz}, \varepsilon_{yz}$	4	$432(4)D3F3=$
047	$432{-}P\varepsilon ds{-}4_z$	6	P_z	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	3	$432(3)D4F4=$
050	$432{-}P\varepsilon ds{-}2_{xy}$	12	$P_x = P_y$ $(P_x = P_y)$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$	12	$432(6)D2F2\neq$
051	$432{-}P\varepsilon ds{-}2_z$	12	$[P_z]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	12	$*432(3)D2F2\neq$
052	$432{-}P\varepsilon ds{-}1$	24	P_x, P_y, P_z (P_x, P_y, P_z)	24	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	24	$432(24/2)A1F1$
055	$m\bar{3} - P\varepsilon ds - 3_{xyz}$	8	$P_x = P_y = P_z$	8	$\delta\varepsilon_{11}, \delta\varepsilon_{11}, \delta\varepsilon_{11}, \varepsilon_{23}, \varepsilon_{23}, \varepsilon_{23}$	4	$m3(4)D3F3=$
057	$m\bar{3} - P\varepsilon ds - m_x m_y 2_z$	6	P_z	6	$\delta\varepsilon_{11}, \delta\varepsilon_{22}, \delta\varepsilon_{33}, 0, 0, 0$	3	$m3(3)DmFmm2=$
060	$m\bar{3} - P\varepsilon ds - m_z$	12	P_x, P_y	12	$\delta\varepsilon_{11}, \delta\varepsilon_{22}, \delta\varepsilon_{33}, 0, 0, \varepsilon_{12}$	6	$m3(6)AmFm=$
061	$m\bar{3} - P\varepsilon ds - 2_z$	12	$[P_z]$	6	$\delta\varepsilon_{11}, \delta\varepsilon_{22}, \delta\varepsilon_{33}, 0, 0, \varepsilon_{12}$	6	$*m3(3)D2F2\neq$
063	$m\bar{3} - P\varepsilon ds - 1$	24	P_x, P_y, P_z	24	$\delta\varepsilon_{11}, \delta\varepsilon_{22}, \delta\varepsilon_{33}, \varepsilon_{23}, \varepsilon_{31}, \varepsilon_{12}$	12	$m3(12)A1F1=$
064	$23{-}P\varepsilon ds{-}3_{xyyz}$	4	$P_x = P_y = P_z$	4	$\delta\varepsilon_{11}, \delta\varepsilon_{11}, \delta\varepsilon_{11}, \varepsilon_{23}, \varepsilon_{23}, \varepsilon_{23}$	4	$23(4/2)D3F3$
066	$23{-}P\varepsilon ds{-}2_z$	6	P_z	6	$\delta\varepsilon_{11}, \delta\varepsilon_{22}, \delta\varepsilon_{33}, 0, 0, \varepsilon_{12}$	6	$23(3)D2F2\neq$
067	$23{-}P\varepsilon ds{-}1$	12	P_x, P_y, P_z	12	$\delta\varepsilon_{11}, \delta\varepsilon_{22}, \delta\varepsilon_{33}, \varepsilon_{23}, \varepsilon_{31}, \varepsilon_{12}$	12	$23(12/2)A1F1$
Hexagonal and trigonal parent phases					$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0,0,0$		
069	$6/mmm{-}Pd{-}6mm$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$6/mmm(1)$ $D6F6mm=$
073	$6/mmm{-}Pd{-}6$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*6/mmm(1)D6F6=$
075	$6/mmm{-}Pds{-}3_z m_x$ $6/mmm{-}Pds{-}3_z\ m_y$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*6/mmm(1)$ $D6F3m=$
078	$6/mmm{-}Pds{-}3$	8	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*6/mmm(1)D6F3=$
080	$6/mmm{-}P\varepsilon ds{-}m_x m_y 2_z$	6	(P_z)	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$	3	$*6/mmm(3)$ $D6Fmm2=$
081	$6/mmm{-}P\varepsilon ds{-}m_x m_z 2_y$	6	P_y		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$	3	$6/mmm(3)$ $D2Fmm2=$

Table C.1 (continued)

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
	$6/mmm{-}P\varepsilon ds{-}m_ym_z2_x$		P_x		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$		
085	$6/mmm{-}P\varepsilon ds{-}m_x$	12	$[P_y, P_z]$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	6	$6/mmm(6)A6Fm=$
	$6/mmm{-}P\varepsilon ds{-}m_y$		$[P_x, P_z]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, -\sqrt{3}\varepsilon_{zx}, \varepsilon_{zx}, (\sqrt{3}/2)(\delta\varepsilon_{xx}-\delta\varepsilon_{yy})$		
086	$6/mmm{-}P\varepsilon ds{-}m_z$	12	P_x, P_y	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$6/mmm(6)A6Fm=$
087	$6/mmm{-}P\varepsilon ds{-}2_x$	12	$[P_x]$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	6	$*6/mmm(3)D2F2$
	$6/mmm{-}P\varepsilon ds{-}2_y$		$[P_y]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, -\sqrt{3}\varepsilon_{zx}\varepsilon_{zx}, \varepsilon_{zx}, (\sqrt{3}/2)(\delta\varepsilon_{xx}-\delta\varepsilon_{yy})$		
088	$6/mmm{-}P\varepsilon ds{-}2_z$	12	(P_z)	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$*6/mmmD2_zFmm2\neq$
090	$6/mmm{-}P\varepsilon ds{-}1$	24	$[P_x, P_y, P_z]$	24	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	12	$6/mmm(12)A1F1=$
092	$\bar{6}m2 - Pds - 3m$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*\bar{6}m2(1)D\bar{6}F3m=$
094	$\bar{6}m2 - Pds - 3$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$\bar{6}m2(1)D\bar{6}F3=$
095	$\bar{6}m2 - P\varepsilon ds - m_ym_z2_x$	3	P_x	3	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, (\sqrt{3}/2)(\delta\varepsilon_{xx}-\delta\varepsilon_{yy})$	3	$*\bar{6}m2(3/2)D2Fmm2$
096	$\bar{6}m2 - P\varepsilon ds - m_z$	6	P_x, P_y	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$\bar{6}m2(6/2)A\bar{6}Fm$
097	$\bar{6}m2 - P\varepsilon ds - m_x$	6	(P_y, P_z)	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	6	$\bar{6}m2(6/2)Am_xFm$
098	$\bar{6}m2 - P\varepsilon ds - 2_x$	6	(P_y)	3	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \sqrt{3}\varepsilon_{zx}, \varepsilon_{zx}, (\sqrt{3}/2)(\delta\varepsilon_{xx}\text{-}\delta\varepsilon_{yy})$	6	$*\bar{6}m2(12/2)A1F1$
099	$\bar{6}m2 - P\varepsilon ds - 1$	12	(P_x, P_y, P_z)	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	12	$\bar{6}m2(12/2)A1F1$
104	$6mm{-}P\varepsilon ds{-}m_y$	6	$P_y, \delta P_z$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	6	$6mm(6/2)AmFm$
	$6mm{-}P\varepsilon ds{-}m_x$		$P_x, \delta P_z$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, {-}{-}\sqrt{3}\varepsilon_{zx}, \varepsilon_{zx}, (\sqrt{3}/22)(\delta\varepsilon_{xx}-\delta\varepsilon_{yy})$		
106	$6mm{-}P\varepsilon ds{-}1$	12	$P_x, P_y, \delta P_z$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	12	$6mm(12/2)A1F1$
107	$622{-}Pd{-}6$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$622(1)D6F6\Vert$
109	$622{-}Pds{-}3$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*622(12)D6F3=$
111	$622{-}P\varepsilon ds{-}2_x$	6	P_x	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, -\sqrt{3}\varepsilon_{zx}, \varepsilon_{zx}, (\sqrt{3}/2)(\delta\varepsilon_{xx}-\delta\varepsilon_{yy})$	6	$622(3)D2F2\neq$
	$622{-}P\varepsilon ds{-}2_y$		P_y		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$		

Table C.1 (continued)

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
112	$622-P\varepsilon ds-2_z$	2	(P_z)	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	6	$*622(1)D6F2\neq$
113	$622-P\varepsilon ds-1$	12	$P_x, P_y, (P_z)$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	12	$622(12/2)A1F1$
115	$6/m-Pd-6$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$6/m(1)D6F6=$
117	$6/m-Pds-3$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*6/mD6F3=$
119	$6/m-P\varepsilon ds-m$	6	P_x, P_y	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	3	$6/m(3)A6Fm=$
120	$6/m-P\varepsilon ds-2$	6	(P_z)	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	3	$*6/m(1)D6F2$
122	$6/m-P\varepsilon ds-1$	12	$[P_x, P_y, P_z]$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	6	$6/m(6)A1F1=$
123	$\bar{6}-Pds-3$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$\bar{6}(1)D\bar{6}F3=$
124	$\bar{6}-P\varepsilon ds-m$	3	P_x, P_y	3	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	3	$\bar{6}(3/2)A\bar{6}Fm$
125	$\bar{6}-P\varepsilon ds-1$	6	(P_x, P_y, P_z)	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	6	$\bar{6}(6/2)A1F1$
128	$6-P\varepsilon ds-1$	6	$P_x, P_y, \delta P_z$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	6	$6(6/2)A1F1$
129	$\bar{3}m-Pd-3m$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$\bar{3}m(1)D\bar{3}F3m=$
132	$\bar{3}m-Pds-3m$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$*\bar{3}m(1)D\bar{3}F3=$
134	$\bar{3}m-P\varepsilon ds-m_x$	6	$P_y, (P_z)$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	3	$\bar{3}m(3)AmFm=$
135	$\bar{3}m-P\varepsilon ds-2_x$	6	P_x	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	3	$\bar{3}m(3)DmF2=$
137	$\bar{3}m-P\varepsilon ds-1$	12	$P_x, P_y, (P_z)$	12	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	6	$\bar{3}m(6)A1F1=$
139	$3m-P\varepsilon ds-m_x$	3	$P_y, \delta P_z$	3	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	3	$3m(3/2)AmFm$
140	$3m-P\varepsilon ds-1$	6	$P_x, P_y, \delta P_z$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	6	$3m(6/2)A1F1$
141	$32-Pds-3$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$32(1)D3F3=$
142	$32-P\varepsilon ds-2_x$	3	P_x	3	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	3	$32(3/2)D2F2$
143	$32-P\varepsilon ds-1$	6	$P_x, P_y, (P_z)$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	6	$32(6/2)A1F1$
144	$\bar{3}-Pd-3$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$\bar{3}(1)D3F3=$
146	$\bar{3}-P\varepsilon ds-1$	6	$P_x, P_y, (P_z)$	6	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	3	$\bar{3}(3)A1F1=$
147	$3-P\varepsilon ds-1$	3	P_x, P_y	3	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	3	$3(3/2)A1F1$

Table C.1 (continued)

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
Tetragonal parent phase					$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0,0,0		
149	$4/mmm{-}Pd{-}4mm$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0, 0, 0	1	$4/mmm(1)D4F4mm{=}$
153	$4/mmm{-}Pds{-}4$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0, 0, 0	1	$*4/mmm(1)D4F4{=}$
155	$4/mmm{-}P\varepsilon ds{-}m_y m_z 2_x$	4	P_x	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}$, 0, 0, 0	2	$4/mmm(2)D2Fmm2{=}$
	$4/mmm - P\varepsilon ds - m_{\bar{x}y} m_z 2_{xy}$		$P_x = P_y$		$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}		
156	$4/mmm{-}P\varepsilon ds{-}m_x m_y 2_z$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}$, 0, 0, 0	2	$*4/mmm(2)D4Fmm2{\neq}$
	$4/mmm - P\varepsilon ds - m_{xy} m_{\bar{x}y} 2_z$				$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}		
160	$4/mmm{-}P\varepsilon ds{-}m_x$	8	$[P_y, P_z]$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}$, 0, 0	4	$*4/mmm(4)A2Fm{=}$
	$4/mmm{-}P\varepsilon ds{-}m_{xy}$		$[P_x = P_y, P_z]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$		
161	$4/mmm{-}P\varepsilon ds{-}m_z$	8	P_x, P_y	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}	4	$4/mmm(4)A4Fm{=}$
162	$4/mmm{-}P\varepsilon ds{-}2_x$	8	$[P_x]$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}$, 0, 0	4	$*4/mmm(2)D4F2$
	$4/mmm{-}P\varepsilon ds{-}2_{xy}$		$[P_x = P_y]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$		
163	$4/mmm{-}P\varepsilon ds{-}2_z$	8	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}	4	$*4/mmm(1)D4F2$
165	$4/mmm{-}P\varepsilon ds{-}1$	16	$[P_x, P_y, P_z]$	16	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	8	$4/mmm(8)A1F1{=}$
167	$\bar{4}2m{-}P\varepsilon ds{-}mm2$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}	2	$\bar{4}2m(1)D\bar{4}Fmm2{\neq}$
169	$\bar{4}2m{-}P\varepsilon ds{-}m_{xy}$	4	$P_x = P_y, P_z$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$	4	$\bar{4}2m(4/2)AmFm$
170	$\bar{4}2m{-}P\varepsilon ds{-}2_x$	4	P_x	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}$, 0, 0	4	$\bar{4}2m(2)D2F2{\neq}$
171	$\bar{4}2m{-}P\varepsilon ds{-}2_z$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}	4	$*\bar{4}2m(1)D\bar{4}F2$
172	$\bar{4}2m{-}P\varepsilon ds{-}1$	8	$P_x, P_y, (P_z)$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	8	$\bar{4}2m(8/2)A1F1$
175	$4mm{-}P\varepsilon ds{-}m_x$	4	$P_y, \delta P_z$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}$, 0, 0	4	$4mm(4/2)AmFm$
	$4mm{-}P\varepsilon ds{-}m_{xy}$		$P_x = P_y, \delta P_z$		$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$		
177	$4mm{-}P\varepsilon ds{-}1$	8	$P_x, P_y, \delta P_z$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	8	$4mm(8/2)A1F1$
178	$422{-}Pds{-}4$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}$, 0, 0, 0	1	$422(1)D4F4{=}$
180	$422{-}P\varepsilon ds{-}2_x$	4	P_x	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}$, 0, 0	4	$422(2)D2F2{\neq}$
	$422{-}P\varepsilon ds{-}2_{xy}$		$P_x = P_y$		$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, \varepsilon_{yz}, -\varepsilon_{yz}, \varepsilon_{xy}$		
181	$422{-}P\varepsilon ds{-}2_z$	4	$[P_z]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}$, 0, 0, ε_{xy}	4	$*422(1)D4F3{\neq}$
182	$422{-}P\varepsilon ds{-}1$	8	$P_x, P_y, (P_z)$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	8	$422(8/2)A1F1$

Table C.1 (continued)

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
184	$4/m{-}Pd{-}4$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{xx}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$4/m(1)D4F4=$
186	$4/m{-}P\varepsilon ds{-}m$	4	P_x, P_y	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	2	$4/m(2)A4Fm=$
187	$4/m{-}P\varepsilon ds{-}2$	4	$[P_z]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	2	$*4/m(1)D4F2\neq$
189	$4/m{-}P\varepsilon ds{-}1$	8	$[P_x, P_y, P_z]$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	4	$4/m(4)A1F1=$
190	$\bar{4} - P\varepsilon ds - 2$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$	2	$\bar{4}(1)D\bar{4}F2$
191	$\bar{4} - P\varepsilon ds - 1$	4	$P_x, P_y, (P_z)$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	4	$\bar{4}(4/2)A1F1$
193	$4{-}P\varepsilon ds{-}1$	4	$P_x, P_y, \delta P_z$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	4	$4(4/2)A1F1$
Orthorhombic parent phase					$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0{,}0{,}0$		
194	$mmm{-}Pd{-}m_xm_y2_z$	2	P_z	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$	1	$mmm(1)D2Fmm2=$
	$mmm{-}Pd{-}m_xm_z2_y$		P_y		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$		
	$mmm{-}Pd{-}m_ym_z2_x$		P_x		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, 0$		
197	$mmm{-}P\varepsilon ds{-}m_x$	4	$[P_y, P_z]$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	2	$mmm(2)AmFm=$
	$mmm{-}P\varepsilon ds{-}m_y$		$[P_x, P_z]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, \varepsilon_{zx}, 0$		
	$mmm{-}P\varepsilon ds{-}m_z$		$[P_x, P_y]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$		
198	$mmm{-}P\varepsilon ds{-}2_x$	4	$[P_x]$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	2	$*mmm(1)D2F2\neq$
	$mmm{-}P\varepsilon ds{-}2_y$		$[P_y]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, \varepsilon_{zx}, 0$		
	$mmm{-}P\varepsilon ds{-}2_z$		$[P_z]$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$		
200	$mmm{-}P\varepsilon ds{-}1$	8	$[P_x, P_y, P_z]$	8	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	4	$mmm(4)A1F1=$
201	$mm2{-}P\varepsilon ds{-}m_x$	2	$P_y, \delta P_z$	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	2	$mm2(2/2)AmFm$
	$mm2{-}P\varepsilon ds{-}m_y$		$P_x, \delta P_z$		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, \varepsilon_{zx}, 0$		
203	$mm2{-}P\varepsilon ds{-}1$	4	$[P_{x,\,y}], \delta P_z$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	4	$mm2(4/2)A1F1$
204	$222{-}P\varepsilon ds{-}2_x$	2	P_x	2	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, 0, 0$	2	$*222(1)D2F2\neq$
	$222{-}P\varepsilon ds{-}2_y$		P_y		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, \varepsilon_{zx}, 0$		
	$222{-}P\varepsilon ds{-}2_z$		P_z		$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, 0, 0, \varepsilon_{xy}$		
205	$222{-}P\varepsilon ds{-}1$	4	$[P_x, P_y, P_z]$	4	$\delta\varepsilon_{xx}, \delta\varepsilon_{yy}, \delta\varepsilon_{zz}, \varepsilon_{yz}, \varepsilon_{zx}, \varepsilon_{xy}$	4	$222(2/2)A1F1$

Table C.1 (continued)

1 Species no.	2 Species designation	3 q	4 Data on polarization	5 q_P	6 Data on strain	7 q_ε	8 Shuvalov's symbol
monoclinic parent phase					$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, 0,0, $\delta\varepsilon_{xy}$		
206	$2/m-Pd-m$	2	P_x, P_y	2	$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, 0,0, $\delta\varepsilon_{xy}$	1	$*2/m(1)AmFm=$
207	$2/m-Pd-2$	2	P_z	2	$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, 0,0, $\delta\varepsilon_{xy}$	1	$2/m(1)D2F2=$
209	$2/m-P\varepsilon ds-1$	4	$[P_x, P_y, P_z]$	4	$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, ε_{yz}, ε_{zx}, $\delta\varepsilon_{xy}$	2	$2/m(2)A1F1=$
210	$m-P\varepsilon ds-1$	2	P_z	2	$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, ε_{yz}, ε_{zx}, $\delta\varepsilon_{xy}$	2	$m(2/2)A1F1$
211	$2-P\varepsilon ds-1$	2	P_x, P_y	2	$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, ε_{yz}, ε_{zx}, $\delta\varepsilon_{xy}$	2	$2(2/2)A1F1$
Triclinic parent phase					$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, $\delta\varepsilon_{yz}$, $\delta\varepsilon_{zx}$, $\delta\varepsilon_{xy}$		
212	$\bar{1}-Pd-1$	1	P_x, P_y, P_z	2	$\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, $\delta\varepsilon_{yz}$, $\delta\varepsilon_{zx}$, $\delta\varepsilon_{xy}$	1	$\bar{1}(1)A1F1=$

Column 1: sequential number of the species. *Column 2*: symbol of the species. *Column 3*: total number of domain states. *Column 4*: nonzero components of polarization in the phase F, specified for the subgroup orientation shown in the symbol. δP_k, change of polarization component which was already permitted by symmetry in the parent phase; P_k, new component of spontaneous polarization. P_k without brackets—“proper” component of polarization (assuming no unit-cell multiplication), i.e., P_k serves as the order parameter. P_k in brackets—“improper” polarization component, arising as a secondary effect. Two lines are given in the table if both proper and improper scenarios can be responsible for the development of polarization. The distinction between (P_k) and $[P_k]$—see text in Sect. 2.1.9. *Column 5*: number of ferroelectric domain states. *Column 6*: strain components (in the coordinate system of G) compatible with the symmetry of the phase F. If the component is “symmetry breaking” (not allowed in G), it is written as ε_{kl}. If it is already allowed in G, it has the prefix δ. (Remark: two components $\delta\varepsilon_{kl}$, $\delta\varepsilon_{mn}$ compatible with the symmetry of G, which are equal in G, may become different in the phase F. It is then the difference $\delta\varepsilon_{S_{kl}} - \delta\varepsilon_{S_{mn}}$ between them which ‘breaks’ the symmetry.) *Column 7*: number of ferroelastic domain states. Number 1 means that F is nonferroelastic.*Column 8*: Shuvalov's symbol. *Top of each section*: strain components compatible with the symmetry of the parent phase, in the sequence $\delta\varepsilon_{xx}$, $\delta\varepsilon_{yy}$, $\delta\varepsilon_{zz}$, $\delta\varepsilon_{yz}$, $\delta\varepsilon_{zx}$, $\delta\varepsilon_{xy}$

Appendix D
Spontaneous Polarization, Spontaneous Strain, and Orientation of Domain Walls in Ferroic Species

In the tables of this appendix, one finds the information on the spontaneous polarization, spontaneous strain, and orientation of domain walls (DW) in all ferroic species. These tables are compiled by Dr. J. Erhart based on his paper (2004) with corrections.

Table D.1 gives the general information on the ferroic domain states, types of the domain wall separating them, and the number of the table (from Tables. D.2, D.3, D.4, D.5, D.6, D.7, D.8, D.9, D.10, D.11, D.12, D.13, D.14, D.15, D.16, D.17, D.18, D.19, D.20, D.21, D.22, D.23, D.24, D.25, D.26, D.27, D.28, D.29, and D.30) containing the detailed information for a given species. The table number applies to the species of the same line and all following ones until a new table number appears. Tables D.2, D.3, D.4, D.5, D.6, D.7, D.8, D.9, D.10, D.11, D.12, D.13, D.14, D.15, D.16, D.17, D.18, D.19, D.20, D.21, D.22, D.23, D.24, D.25, D.26, D.27, D.28, D.29, and D.30 give the wall orientations in the case where these are conditioned by the mechanical effects, i.e. in the case of W_∞ walls no information on the wall orientation is given. The wall orientation is specified with the components of its normal vector expressed in orthogonal or hexagonal basis (standard crystallographic coordinate choice). The coordinate system is adopted the same as in parent phase. In the titles of Tables D.2, D.3, D.4, D.5, D.6, D.7, D.8, D.9, D.10, D.11, D.12, D.13, D.14, D.15, D.16, D.17, D.18, D.19, D.20, D.21, D.22, D.23, D.24, D.25, D.26, D.27, D.28, D.29, and D.30, the change of the crystalline class at the phase transitions addressed in the table is indicated.

Table D.1 General information on domain states and types of the domain wall

1 Species no.	2 Species designation	3 q_ε	4 q_P	5 Domain wall pairs Charge/neutrality of domain walls	6 Table no.
212	$\bar{1} \to 1$	1	2	$W_\infty^N - W_\infty^C$	D.2
207	$2/m \to 2$	1	2	$W_\infty^N - W_\infty^C$	D.9
206	$2/m \to m$	1	2	$W_\infty^N - W_\infty^C$	
211	$2 \to 1$	2	2	$W_f^N - S^C$	D.3
210	$m \to 1$	2	2	$W_f^C - S^N$	
209	$2/m \to 1$	2	4	$W_f^{N,C} - S^{C,N}$	
208	$2/m \to \bar{1}$	2	0	$W_f - S$	
194	$mmm \to mm2$	1	2	$W_\infty^N - W_\infty^C$	D.21
197	$mmm \to m_x$	2	4	$W_f^{N,C} - W_f^{C,N}$	D.10

Table D.1 (continued)

1 Species no.	2 Species designation	3 q_ε	4 q_P	5 Domain wall pairs Charge/neutrality of domain walls	6 Table no.
198	$mmm \to 2_x$	2	2	$W_f^N - W_f^N$	
196	$mmm \to 2_x/m_x$	2	0	$W_f - W_f$	
201	$mm2 \to m_x$	2	2	$W_f^N - W_f^C$	
204	$222 \to 2_x$	2	2	$W_f^N - W_f^N$	
202	$mm2 \to 2_z$	2	1	$W_f^N - W_f^N$	D.11
200	$mmm \to 1$	4	8	$W_f^{N,C} - S^{C,N}$	D.4
199	$mmm \to \bar{1}$	4	0	$W_f - S$	
203	$mm2 \to 1$	4	4	$W_f^N - S^C$, $W_f^C - S^N$	
205	$222 \to 1$	4	4	$W_f^N - S^C$	
149	$4/mmm \to 4mm$	1	2	$W_\infty^N - W_\infty^C$	D.28
153	$4/mmm \to 4$	1	2	$W_\infty^N - W_\infty^C$	
184	$4/m \to 4$	1	2	$W_\infty^N - W_\infty^C$	
178	$422 \to 4$	1	2	$W_\infty^N - W_\infty^C$	
154	$4/mmm \to m_xm_ym_z$	2	0	$W_f - W_f$	D.22
155	$4/mmm \to 2_xm_ym_z$	2	4	$W_f^{N,C} - W_f^{C,N}$	
156	$4/mmm \to m_xm_y2_z$	2	2	$W_f^N - W_f^N$	
157	$4/mmm \to 2_x2_y2_z$	2	0	$W_f - W_f$	
168	$\bar{4}2m \to 2_x2_y2_z$	2	0	$W_f - W_f$	
174	$4mm \to m_xm_y2_z$	2	1	$W_f^N - W_f^N$	
179	$422 \to 2_x2_y2_z$	2	0	$W_f - W_f$	
167	$\bar{4}2m \to m_{xy}m_{\bar{x}y}2_z$	2	2	$W_f^N - W_f^N$	D.23
162	$4/mmm \to 2_x$	3	4	$W_f^N - W_f^N$, $W_f^{N,C} - S^{C,N}$	D.12
160	$4/mmm \to m_x$	3	8	$W_f^{N,C} - W_f^{C,N}$, $W_f^{N,C} - S^{C,N}$	
158	$4/mmm \to 2_x/m_x$	3	0	$W_f - W_f$, $W_f - S$	
170	$\bar{4}2m \to 2_x$	3	4	$W_f^N - W_f^N$, $W_f^C - S^N$	
175	$4mm \to m_x$	3	4	$W_f^N - W_f^C$, $W_f^C - S^N$	
180	$422 \to 2_x$	3	4	$W_f^N - W_f^N$, $W_f^N - S^C$	
163	$4/mmm \to 2_z$	4	2	$W_f^N - W_f^N$, $S^N - S^N$	D.13
161	$4/mmm \to m_z$	4	8	$W_f^{N,C} - W_f^{C,N}$, $S^* - S^*$	
159	$4/mmm \to 2_z/m_z$	4	0	$W_f - W_f$, $S - S$	
171	$\bar{4}2m \to 2_z$	4	2	$W_f^N - W_f^N$, $S^N - S^N$	
176	$4mm \to 2_z$	4	1	$W_f^N - W_f^N$, $S^N - S^N$	
181	$422 \to 2_z$	4	2	$W_f^N - W_f^N$, $S^N - S^N$	
187	$4/m \to 2_z$	2	2	$S^N - S^N$	
186	$4/m \to m_z$	2	4	$S^* - S^*$	
185	$4/m \to 2_z/m_z$	2	0	$S - S$	
190	$\bar{4} \to 2_z$	2	2	$S^N - S^N$	
192	$4 \to 2_z$	2	1	$S^N - S^N$	
169	$\bar{4}2m \to m_{xy}$	4	4	$W_f^N - W_f^C$, $W_f^N - S^{vC}$	D.14
165	$4/mmm \to 1$	8	16	R, $W_f^{N,C} - S^{C,N}$	D.5
164	$4/mmm \to \bar{1}$	8	0	R, $W_f - S$	
172	$\bar{4}2m \to 1$	8	8	R, $W_f^N - S^C$, $W_f^C - S^N$	
177	$4mm \to 1$	8	8	R, $W_f^N - S^C$, $W_f^C - S^N$	
182	$422 \to 1$	8	8	R, $W_f^N - S^C$	
189	$4/m \to 1$	4	8	R, $W_f^{N,C} - S^{C,N}$	

Table D.1 (continued)

1 Species no.	2 Species designation	3 q_ε	4 q_P	5 Domain wall pairs Charge/neutrality of domain walls	6 Table no.
188	$4/m \rightarrow \bar{1}$	4	0	R, $W_f - S$	
191	$\bar{4} \rightarrow 1$	4	4	R, $W_f^N - S^C$	
193	$4 \rightarrow 1$	4	4	R, $W_f^N - S^C$	
129	$\bar{3}m \rightarrow 3m$	1	2	$W_\infty^N - W_\infty^C$	D.28
132	$\bar{3}m \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
141	$32 \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
144	$\bar{3} \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
134	$\bar{3}m \rightarrow m_x$	3	6	$W_f^{N,C} - S^{C,N}$	D.15
135	$\bar{3}m \rightarrow 2_x$	3	6	$W_f^{N,C} - S^{C,N}$	
133	$\bar{3}m \rightarrow 2_x/m_x$	3	0	$W_f - S$	
139	$3m \rightarrow m_x$	3	3	$W_f^C - S^N$	
142	$32 \rightarrow 2_x$	3	3	$W_f^N - S^C$	
137	$\bar{3}m \rightarrow 1$	6	12	R, $W_f^{N,C} - S^{C,N}$	D.6
136	$\bar{3}m \rightarrow \bar{1}$	6	0	R, $W_f - S$	
140	$3m \rightarrow 1$	6	6	R, $W_f^C - S^N$	
143	$32 \rightarrow 1$	6	6	$R, W_f^N - S^C$	
145	$\bar{3} \rightarrow \bar{1}$	3	0	R	
146	$\bar{3} \rightarrow 1$	3	6	R	
147	$3 \rightarrow 1$	3	3	R	
69	$6/mmm \rightarrow 6mm$	1	2	$W_\infty^N - W_\infty^C$	D.28
73	$6/mmm \rightarrow 6$	1	2	$W_\infty^N - W_\infty^C$	
107	$622 \rightarrow 6$	1	2	$W_\infty^N - W_\infty^C$	
115	$6/m \rightarrow 6$	1	2	$W_\infty^N - W_\infty^C$	
75	$6/mmm \rightarrow 3_z m_x$	1	2	$W_\infty^N - W_\infty^C$	D.28
78	$6/mmm \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
92	$\bar{6}m2 \rightarrow 3_z m_x$	1	2	$W_\infty^N - W_\infty^C$	
94	$\bar{6}m2 \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
109	$622 \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
123	$\bar{6} \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
117	$6/m \rightarrow 3$	1	2	$W_\infty^N - W_\infty^C$	
79	$6/mmm \rightarrow m_x m_y m_z$	3	0	$W_f - W_f$	D.24
80	$6/mmm \rightarrow m_x m_y 2_z$	3	2	$W_f^N - W_f^N$	
81	$6/mmm \rightarrow 2_x m_y m_z$	3	6	$W_f^{N,C} - W_f^{C,N}$	
82	$6/mmm \rightarrow 2_x 2_y 2_z$	3	0	$W_f - W_f$	
95	$\bar{6}m2 \rightarrow m_x 2_y m_z$	3	3	$W_f^N - W_f^C$	
103	$6mm \rightarrow m_x m_y 2_z$	3	1	$W_f^N - W_f^N$	
110	$622 \rightarrow 2_x 2_y 2_z$	3	0	$W_f - W_f$	
87	$6/mmm \rightarrow 2_x$	6	6	$W_f^N - W_f^N$, $W_f^{N,C} - S^{C,N}$	D.16
85	$6/mmm \rightarrow m_x$	6	12	$W_f^{N,C} - W_f^{C,N}$, $W_f^{N,C} - S^{C,N}$	
83	$6/mmm \rightarrow 2_x/m_x$	6	0	$W_f - W_f$, $W_f - S$	
97	$\bar{6}m2 \rightarrow m_x$	6	6	$W_f^N - W_f^C$, $W_f^N - S^C$, $W_f^C - S^N$	
104	$6mm \rightarrow m_x$	6	6	$W_f^N - W_f^C$, $W_f^C - S^N$	
111	$622 \rightarrow 2_x$	6	6	$W_f^N - W_f^N$, $W_f^N - S^C$	
88	$6/mmm \rightarrow 2_z$	6	2	$W_f^N - W_f^N$, $S^N - S^N$	D.17
86	$6/mmm \rightarrow m_z$	6	12	$W_f^{N,C} - W_f^{C,N}$, $S^* - S^*$	

Table D.1 (continued)

1 Species no.	2 Species designation	3 q_ε	4 q_P	5 Domain wall pairs Charge/neutrality of domain walls	6 Table no.
84	$6/mmm \rightarrow 2_z/m_z$	6	0	$W_f - W_f$, $S - S$	
96	$\bar{6}m2 \rightarrow m_z$	6	6	$W_f^N - W_f^C$, $S^* - S^*$	
105	$6mm \rightarrow 2_z$	6	1	$W_f^N - W_f^N$, $S^N - S^N$	
112	$622 \rightarrow 2_z$	6	2	$W_f^N - W_f^N$, $S^N - S^N$	
120	$6/m \rightarrow 2_z$	3	2	$S^N - S^N$	
119	$6/m \rightarrow m_z$	3	6	$S^* - S^*$	
118	$6/m \rightarrow 2_z/m_z$	3	0	$S - S$	
124	$\bar{6} \rightarrow m_z$	3	3	$S^* - S^*$	
127	$6 \rightarrow 2_z$	3	1	$S^N - S^N$	
98	$\bar{6}m2 \rightarrow 2_y$	6	3	$W_f^N - W_f^N$, $W_f^N - S^C$, $W_f^C - S^N$	D.18
90	$6/mmm \rightarrow 1$	12	24	R, $W_f^{N,C} - S^{C,N}$	D.7
89	$6/mmm \rightarrow \bar{1}$	12	0	R, $W_f - S$	
99	$\bar{6}m2 \rightarrow 1$	12	12	R, $W_f^N - S^C$, $W_f^C - S^N$	
106	$6mm \rightarrow 1$	12	12	R, $W_f^N - S^C$, $W_f^C - S^N$	
113	$622 \rightarrow 1$	12	12	R, $W_f^N - S^C$	
122	$6/m \rightarrow 1$	6	12	R, $W_f^{N,C} - S^{C,N}$	
121	$6/m \rightarrow \bar{1}$	6	0	R, $W_f - S$	
125	$\bar{6} \rightarrow 1$	6	6	R, $W_f^C - S^N$	
128	$6 \rightarrow 1$	6	6	R, $W_f^N - S^C$	
5	$m\bar{3}m \rightarrow \bar{3}_{xyz}m_{\bar{x}y}$	4	0	$W_f - W_f$	D.30
6	$m\bar{3}m \rightarrow 3_{xyz}m_{\bar{x}y}$	4	8	$W_f^{N,C} - W_f^{C,N}$	
7	$m\bar{3}m \rightarrow 3_{xyz}2_{\bar{x}y}$	4	0	$W_f - W_f$	
8	$m\bar{3}m \rightarrow \bar{3}_{xyz}$	4	0	$W_f - W_f$	
9	$m\bar{3}m \rightarrow 3_{xyz}$	4	8	$W_f^{N,C} - W_f^{C,N}$	
34	$\bar{4}3m \rightarrow 3_{xyz}m_{\bar{x}y}$	4	4	$W_f^N - W_f^C$	
35	$\bar{4}3m \rightarrow 3_{xyz}$	4	4	$W_f^N - W_f^C$	
44	$432 \rightarrow 3_{xyz}2_{\bar{x}y}$	4	0	$W_f - W_f$	
45	$432 \rightarrow 3_{xyz}$	4	8	$W_f^{N,C} - W_f^{C,N}$	
54	$m\bar{3} \rightarrow \bar{3}_{xyz}$	4	0	$W_f - W_f$	
55	$m\bar{3} \rightarrow 3_{xyz}$	4	8	$W_f^{N,C} - W_f^{C,N}$	
64	$23 \rightarrow 3_{xyz}$	4	4	$W_f^N - W_f^C$	
10	$m\bar{3}m \rightarrow 4_z/m_zm_xm_y$	3	0	$W_f - W_f$	D.29
13	$m\bar{3}m \rightarrow 4_zm_xm_{xy}$	3	6	$W_f^{N,C} - W_f^{C,N}$	
11	$m\bar{3}m \rightarrow \bar{4}_z2_{xy}m_x$	3	0	$W_f - W_f$	
12	$m\bar{3}m \rightarrow \bar{4}_z2_xm_{xy}$	3	0	$W_f - W_f$	
14	$m\bar{3}m \rightarrow 4_z2_x2_{xy}$	3	0	$W_f - W_f$	
15	$m\bar{3}m \rightarrow 4_z/m_z$	3	0	$W_f - W_f$	
16	$m\bar{3}m \rightarrow \bar{4}$	3	0	$W_f - W_f$	
17	$m\bar{3}m \rightarrow 4$	3	6	$W_f^{N,C} - W_f^{C,N}$	
36	$\bar{4}3m \rightarrow \bar{4}_z2_xm_{xy}$	3	0	$W_f - W_f$	
37	$\bar{4}3m \rightarrow \bar{4}$	3	0	$W_f - W_f$	
46	$432 \rightarrow 4_z2_x2_{xy}$	3	0	$W_f - W_f$	
47	$432 \rightarrow 4$	3	6	$W_f^{N,C} - W_f^{C,N}$	
18	$m\bar{3}m \rightarrow m_xm_ym_z$	6	0	R, $W_f - W_f$	D.25
20	$m\bar{3}m \rightarrow m_xm_y2_z$	6	6	R, $W_f^N - W_f^N$, $W_f^{N,C} - W_f^{C,N}$	

Table D.1 (continued)

1 Species no.	2 Species designation	3 q_ε	4 q_P	5 Domain wall pairs Charge/neutrality of domain walls	6 Table no.
23	$m\bar{3}m \to 2_x2_y2_z$	6	0	R, $W_f - W_f$	
39	$\bar{4}3m \to 222$	6	0	R, $W_f - W_f$	
48	$432 \to 2_x2_y2_z$	6	0	R, $W_f - W_f$	
56	$m\bar{3} \to mmm$	3	0	R	
57	$m\bar{3} \to m_xm_y2_z$	3	6	R	
58	$m\bar{3} \to 222$	3	0	R	
65	$23 \to 222$	3	0	R	
21	$m\bar{3}m \to m_{xy}m_{\bar{x}y}2_z$	6	6	$W_f^N - W_f^N$, $W_f^{N,C} - S^{C,N}$	D.26
19	$m\bar{3}m \to m_{xy}m_{\bar{x}y}m_z$	6	0	$W_f - W_f$, $W_f - S$	
24	$m\bar{3}m \to 2_{xy}2_{\bar{x}y}2_z$	6	0	$W_f - W_f$, $W_f - S$	
49	$432 \to 2_{xy}2_{\bar{x}y}2_z$	6	0	$W_f - W_f$, $W_f - S$	
22	$m\bar{3}m \to 2_{xy}m_{\bar{x}y}m_z$	6	12	$W_f^{N,C} - W_f^{C,N}$, $W_f^{N,C} - S^{C,N}$	D.27
38	$\bar{4}3m \to m_{xy}m_{\bar{x}y}2_z$	6	6	$W_f^N - W_f^N$, $W_f^C - S^N$	
29	$m\bar{3}m \to 2_{xy}$	12	12	R, $W_f^N - W_f^N$, $W_f^{N,C} - S^{C,N}$	D.19
28	$m\bar{3}m \to m_{xy}$	12	24	R, $W_f^{N,C} - W_f^{C,N}$, $W_f^{N,C} - S^{C,N}$	
25	$m\bar{3}m \to 2_{xy}/m_{xy}$	12	0	R, $W_f - W_f$, $W_f - S$	
40	$\bar{4}3m \to m_{xy}$	12	12	R, $W_f^N - W_f^C$, $W_f^N - S^C$, $W_f^C - S^N$	
50	$432 \to 2_{xy}$	12	12	R, $W_f^N - W_f^N$, $W_f^N - S^C$	
30	$m\bar{3}m \to 2_z$	12	6	R, $W_f^N - W_f^N$, $W_f^{N,C} - S^{C,N}$, $S^N - S^N$	D.20
27	$m\bar{3}m \to m_z$	12	24	R, $W_f^{N,C} - W_f^{C,N}$, $W_f^{N,C} - S^{C,N}$, $S^* - S^*$	
26	$m\bar{3}m \to 2_z/m_z$	12	0	R, $W_f - W_f$, $W_f - S$, $S - S$	
41	$\bar{4}3m \to 2_z$	12	6	R, $W_f^N - W_f^N$, $W_f^C - S^N$, $S^N - S^N$	
51	$432 \to 2_z$	12	6	R, $W_f^N - W_f^N$, $W_f^N - S^C$, $S^N - S^N$	
61	$m\bar{3} \to 2_z$	6	6	R, $W_f^N - W_f^N$	
60	$m\bar{3} \to m_z$	6	12	R, $W_f^{N,C} - W_f^{C,N}$	
59	$m\bar{3} \to 2_z/m_z$	6	0	R, $W_f - W_f$	
66	$23 \to 2_z$	6	6	R, $W_f^N - W_f^N$	
32	$m\bar{3}m \to 1$	24	48	R, $W_f^{N,C} - S^{C,N}$	D.8
31	$m\bar{3}m \to \bar{1}$	24	0	R, $W_f - S$	
42	$\bar{4}3m \to 1$	24	24	R, $W_f^N - S^C$, $W_f^C - S^N$	
52	$432 \to 1$	24	24	R,$W_f^N - S^C$	
63	$m\bar{3} \to 1$	12	24	R, $W_f^{N,C} - S^{C,N}$	
62	$m\bar{3} \to \bar{1}$	12	0	R, $W_f - S$	
67	$23 \to 1$	12	12	R, $W_f^N - S^C$	
1	$m\bar{3}m \to \bar{4}3m$	1	0		
2	$m\bar{3}m \to 432$	1	0		
3	$m\bar{3}m \to m\bar{3}$	1	0		
4	$m\bar{3}m \to 23$	1	0		
33	$\bar{4}3m \to 23$	1	0		
43	$432 \to 23$	1	0		
53	$m\bar{3} \to 23$	1	0		
68	$6/mmm \to \bar{6}_zm_y2_x$	1	0		
70	$6/mmm \to 622$	1	0		

Table D.1 (continued)

1 Species no.	2 Species designation	3 q_ε	4 q_P	5 Domain wall pairs Charge/neutrality of domain walls	6 Table no.
71	$6/mmm \to 6/m$	1	0		
72	$6/mmm \to \bar{6}$	1	0		
74	$6/mmm \to \bar{3}_z m_x$	1	0		
76	$6/mmm \to 3_z 2_x$	1	0		
77	$6/mmm \to \bar{3}$	1	0		
91	$\bar{6}m2 \to \bar{6}$	1	0		
93	$\bar{6}m2 \to 32$	1	0		
108	$622 \to 3_z 2_x$	1	0		
114	$6/m \to \bar{6}$	1	0		
116	$6/m \to \bar{3}$	1	0		
130	$\bar{3}m \to 32$	1	0		
131	$\bar{3}m \to \bar{3}$	1	0		
148	$4/mmm \to \bar{4}_z 2_x m_{xy}$	1	0		
150	$4/mmm \to 422$	1	0		
151	$4/mmm \to 4/m$	1	0		
152	$4/mmm \to \bar{4}$	1	0		
166	$\bar{4}2m \to \bar{4}$	1	0		
183	$4/m \to \bar{4}$	1	0		
195	$mmm \to 222$	1	0		
100	$6mm \to 6$	1	1		
101	$6mm \to 3_z m_x$	1	1		
102	$6mm \to 3$	1	1		
126	$6 \to 3$	1	1		
138	$3m \to 3$	1	1		
173	$4mm \to 4$	1	1		

Column 1: sequential number of the species. *Column 2*: symbol of the species. *Column 3*: number of ferroelastic domain states. *Column 4*: number of ferroelectric domain states. *Column 5*: type of permissible pairs of domain walls (domain wall orientation symbols: W_∞-arbitrary, W_f-fixed, *S*-dependent on spontaneous strains, *R*-no walls). Charge/neutrality of ferroelectric domain walls is labeled by superscript C, N, respectively For centrosymmetric parent phases both superscripts are used in some cases, i.e. the same domain wall is either charged or neutral according to the choice of spontaneous polarization pair (antiparallel spontaneous polarizations are allowed in such species). When the charge/neutrality of a domain wall depends on the specific values of spontaneous strains, it is labeled by superscript*. *Column 6*: number of the table containing the detailed information on domain states and orientations of domain walls for given species. The table number applies to the species of the same line and all following ones until a new table number appears. *The last 34 rows*: species belonging to high-order ferroics where the domain states are distinguishable neither by spontaneous polarization nor by spontaneous strain. Here, the domain walls are of W_∞ type and electroneutral for any orientation.

Table D.2 Triclinic to triclinic

Species strains		$\bar{1} \rightarrow 1$ polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$

Table D.3 Monoclinic to triclinic

All species		$m \rightarrow 1$	$2/m \rightarrow 1$ $2/m \rightarrow \bar{1}(P=0)$ $2 \rightarrow 1$ (upper polarizations only)
strains		polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad P_2 \quad -P_3)$ $(P_1 \quad -P_2 \quad P_3)$

S	1	2
1	N/A	$(010)^{\mathrm{N}}$ $(10a)^{\mathrm{C}}$
2	$(010)^{\mathrm{C}}$ $(10a)^{\mathrm{N}}$	N/A

$a = \varepsilon_4/\varepsilon_6$

Table D.4 Orthorhombic to triclinic

All species		$mmm \rightarrow 1$ $mmm \rightarrow \bar{1}(P=0)$	$mm2 \rightarrow 1$	$222 \rightarrow 1$
strains		polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_2 \quad P_3)$ $(P_1 \quad -P_2 \quad -P_3)$	$(-P_1 \quad P_2 \quad P_3)$	$(P_1 \quad -P_2 \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_2 \quad P_3)$ $(-P_1 \quad P_2 \quad -P_3)$	$(P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad P_2 \quad -P_3)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & -\varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad -P_3)$ $(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$

Table D.4 (continued)

$mmm \to 1$, $mmm \to \bar{1}(P = 0)$ (above diagonal)
$mm2 \to 1$ (below diagonal)

S	1	2	3	4
1	N/A	$(100)^{\mathrm{C}}$ $(01a)^{\mathrm{N}}$	$(010)^{\mathrm{C}}$ $(10b)^{\mathrm{N}}$	$(001)^{\mathrm{C}}$ $(1c0)^{\mathrm{N}}$
2	$(100)^{\mathrm{C}}$ $(01a)^{\mathrm{N}}$	N/A	$(001)^{\mathrm{N}}$ $(1\bar{c}0)^{\mathrm{C}}$	$(010)^{\mathrm{N}}$ $(10\bar{b})^{\mathrm{C}}$
3	$(010)^{\mathrm{C}}$ $(10b)^{\mathrm{N}}$	$(001)^{\mathrm{N}}$ $(1\bar{c}0)^{\mathrm{C}}$	N/A	$(100)^{\mathrm{N}}$ $(01\bar{a})^{\mathrm{C}}$
4	$(001)^{\mathrm{N}}$ $(1c0)^{\mathrm{C}}$	$(010)^{\mathrm{C}}$ $(10\bar{b})^{\mathrm{N}}$	$(100)^{\mathrm{C}}$ $(01\bar{a})^{\mathrm{N}}$	N/A

$222 \to 1$

S	1	2	3	4
1	N/A	$(100)^{\mathrm{N}}$ $(01a)^{\mathrm{C}}$	$(010)^{\mathrm{N}}$ $(10b)^{\mathrm{C}}$	$(001)^{\mathrm{N}}$ $(1c0)^{\mathrm{C}}$
2		N/A	$(001)^{\mathrm{N}}$ $(1\bar{c}0)^{\mathrm{C}}$	$(010)^{\mathrm{N}}$ $(10\bar{b})^{\mathrm{C}}$
3			N/A	$(100)^{\mathrm{N}}$ $(01\bar{a})^{\mathrm{C}}$
4				N/A

$a = \varepsilon_5/\varepsilon_6, b = \varepsilon_4/\varepsilon_6, c = \varepsilon_4/\varepsilon_5$

Table D.5 Tetragonal to triclinic

All species		$422 \to 1$ $4 \to 1$ (strains 1–4 only)	$4\,mm \to 1$	$\bar{4}2m \to 1$ $\bar{4} \to 1$ (strains 1–4 only)	$4/mmm \to 1$, $4/mmm \to \bar{1}(P=0)$ $4/m \to 1$, $4/m \to \bar{1}(P=0)$ (strains 1–4 only)
strains		polarizations	polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$
2	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & -\varepsilon_4 & -\varepsilon_6 \end{pmatrix}$	$(-P_2 \quad P_1 \quad P_3)$	$(-P_2 \quad P_1 \quad P_3)$	$(P_2 \quad -P_1 \quad -P_3)$	$(-P_2 \quad P_1 \quad P_3)$ $(P_2 \quad -P_1 \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & -\varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$ $(P_1 \quad P_2 \quad -P_3)$
4	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & \varepsilon_4 & -\varepsilon_6 \end{pmatrix}$	$(P_2 \quad -P_1 \quad P_3)$	$(P_2 \quad -P_1 \quad P_3)$	$(-P_2 \quad P_1 \quad -P_3)$	$(P_2 \quad -P_1 \quad P_3)$ $(-P_2 \quad P_1 \quad -P_3)$
5	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_2 \quad -P_3)$	$(-P_1 \quad P_2 \quad P_3)$	$(P_1 \quad -P_2 \quad -P_3)$	$(-P_1 \quad P_2 \quad P_3)$ $(P_1 \quad -P_2 \quad -P_3)$
6	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_2 \quad -P_3)$	$(P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad P_2 \quad -P_3)$	$(P_1 \quad -P_2 \quad P_3)$ $(-P_1 \quad P_2 \quad -P_3)$
7	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & -\varepsilon_4 & \varepsilon_6 \end{pmatrix}$	$(P_2 \quad P_1 \quad -P_3)$	$(-P_2 \quad -P_1 \quad P_3)$	$(-P_2 \quad -P_1 \quad P_3)$	$(-P_2 \quad -P_1 \quad P_3)$ $(P_2 \quad P_1 \quad -P_3)$
8	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & \varepsilon_4 & \varepsilon_6 \end{pmatrix}$	$(-P_2 \quad -P_1 \quad -P_3)$	$(P_2 \quad P_1 \quad P_3)$	$(P_2 \quad P_1 \quad P_3)$	$(P_2 \quad P_1 \quad P_3)$ $(-P_2 \quad -P_1 \quad -P_3)$

Table D.5 (continued)

$422 \rightarrow 1$ (all eight strains), $4 \rightarrow 1$ (strains 1–4 only) (above diagonal)
$\bar{4}2m \rightarrow 1$ (all eight strains), $4 \rightarrow 1$ (strains 1–4 only) (below diagonal)

S	1	2	3	4	5	6	7	8
1	N/A	R	$(001)^N$ $(1a0)^C$	R	$(100)^N$ $(01b)^C$	$(010)^N$ $(10c)^C$	$(110)^N$ $(1\bar{1}\bar{d}_+)^C$	$(1\bar{1}0)^N$ $(11d_-)^C$
2	R	N/A	R	$(001)^N$ $(\bar{a}10)^C$	$(110)^N$ $(1\bar{1}\bar{d}_-)^C$	$(1\bar{1}0)^N$ $(11\bar{d}_+)^C$	$(010)^N$ $(10\bar{b})^C$	$(100)^N$ $(01c)^C$
3	$(001)^N$ $(1a0)^C$	R	N/A	R	$(010)^N$ $(10\bar{c})^C$	$(100)^N$ $(01\bar{b})^C$	$(1\bar{1}0)^N$ $(11\bar{d}_-)^C$	$(110)^N$ $(1\bar{1}d_+)^C$
4	R	$(001)^N$ $(\bar{a}10)^C$	R	N/A	$(1\bar{1}0)^N$ $(11d_+)^C$	$(110)^N$ $(1\bar{1}d_-)^C$	$(100)^N$ $(01\bar{c})^C$	$(010)^N$ $(10b)^C$
5	$(100)^N$ $(01b)^C$	$(110)^C$ $(1\bar{1}\bar{d}_-)^N$	$(010)^N$ $(10\bar{c})^C$	$(1\bar{1}0)^C$ $(11d_+)^N$	N/A	$(001)^N$ $(1\bar{a}0)^C$	R	R
6	$(010)^N$ $(10c)^C$	$(1\bar{1}0)^C$ $(11\bar{d}_+)^N$	$(100)^N$ $(01\bar{b})^C$	$(110)^C$ $(1\bar{1}d_-)^N$	$(001)^N$ $(1\bar{a}0)^C$	N/A	R	R
7	$(110)^C$ $(1\bar{1}\bar{d}_+)^N$	$(010)^N$ $(10\bar{b})^C$	$(1\bar{1}0)^C$ $(11\bar{d}_-)^N$	$(100)^N$ $(01\bar{c})^C$	R	R	N/A	$(001)^N$ $(a10)^C$
8	$(1\bar{1}0)^C$ $(11d_-)^N$	$(100)^N$ $(01c)^C$	$(110)^C$ $(1\bar{1}d_+)^N$	$(010)^N$ $(10b)^C$	R	R	$(001)^N$ $(a10)^C$	N/A

Table D.5 (continued)

$4/mmm \rightarrow \bar{1}(P=0)$, $4/mmm \rightarrow 1$, $4mm \rightarrow 1$ (all eight strains),
$4/m \rightarrow \bar{1}(P=0)$, $4/m \rightarrow 1$ (strains 1–4 only)

S	1	2	3	4	5	6	7	8
1	N/A	R	$(001)^N$ $(1a0)^C$	R	$(100)^C$ $(01b)^N$	$(010)^C$ $(10c)^N$	$(110)^C$ $(1\bar{1}\bar{d}_+)^N$	$(1\bar{1}0)^C$ $(11d_-)^N$
2		N/A	R	$(001)^N$ $(\bar{a}10)^C$	$(110)^C$ $(1\bar{1}\bar{d}_-)^N$	$(1\bar{1}0)^C$ $(11\bar{d}_+)^N$	$(010)^C$ $(10\bar{b})^N$	$(100)^C$ $(01c)^N$
3			N/A	R	$(010)^C$ $(10\bar{c})^N$	$(100)^C$ $(01\bar{b})^N$	$(1\bar{1}0)^C$ $(11\bar{d}_-)^N$	$(110)^C$ $(1\bar{1}d_+)^N$
4				N/A	$(1\bar{1}0)^C$ $(11d_+)^N$	$(110)^C$ $(1\bar{1}d_-)^N$	$(100)^C$ $(01\bar{c})^N$	$(010)^C$ $(10b)^N$
5					N/A	$(001)^N$ $(1\bar{a}0)^C$	R	R
6						N/A	R	R
7							N/A	$(001)^N$ $(a10)^C$
8								N/A

$a = \varepsilon_4/\varepsilon_5, b = \varepsilon_5/\varepsilon_6, c = \varepsilon_4/\varepsilon_6, d_\pm = (\varepsilon_5 \pm \varepsilon_4)/(\varepsilon_2 - \varepsilon_1)$

Table D.6 Trigonal to triclinic

All species		$32 \to 1$ $\bar{3}m \to \bar{1}(P=0)$ $3 \to 1$, $\bar{3} \to \bar{1}(P=0)$ (strains 1–3 only)	$3m \to 1$	$\bar{3}m \to 1$ $\bar{3} \to 1$ (strains 1–3 only)
strains		polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$
2	$\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ \varepsilon_4^- & \varepsilon_5^- & \varepsilon_6^- \end{pmatrix}$	$(-P_1^+ \quad P_2^- \quad P_3)$	$(-P_1^+ \quad P_2^- \quad P_3)$	$(-P_1^+ \quad P_2^- \quad P_3)$ $(P_1^+ \quad -P_2^- \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ -\varepsilon_4^+ & -\varepsilon_5^+ & \varepsilon_6^+ \end{pmatrix}$	$(-P_1^- \quad -P_2^+ \quad P_3)$	$(-P_1^- \quad -P_2^+ \quad P_3)$	$(-P_1^- \quad -P_2^+ \quad P_3)$ $(P_1^- \quad P_2^+ \quad -P_3)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_2 \quad -P_3)$	$(-P_1 \quad P_2 \quad P_3)$	$(P_1 \quad -P_2 \quad -P_3)$ $(-P_1 \quad P_2 \quad P_3)$
5	$\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ -\varepsilon_4^+ & \varepsilon_5^+ & -\varepsilon_6^+ \end{pmatrix}$	$(-P_1^- \quad P_2^+ \quad -P_3)$	$(P_1^- \quad -P_2^+ \quad P_3)$	$(-P_1^- \quad P_2^+ \quad -P_3)$ $(P_1^- \quad -P_2^+ \quad P_3)$
6	$\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ \varepsilon_4^- & -\varepsilon_5^- & -\varepsilon_6^- \end{pmatrix}$	$(-P_1^+ \quad -P_2^- \quad -P_3)$	$(P_1^+ \quad P_2^- \quad P_3)$	$(-P_1^+ \quad -P_2^- \quad -P_3)$ $(P_1^+ \quad P_2^- \quad P_3)$

$\varepsilon_1^\pm = (1/4)(\varepsilon_1 \pm \sqrt{3}\varepsilon_6 + 3\varepsilon_2), \varepsilon_2^\pm = (1/4)(3\varepsilon_1 \pm \sqrt{3}\varepsilon_6 + \varepsilon_2), \varepsilon_6^\pm = (1/2)(\pm\sqrt{3}\varepsilon_1 - \varepsilon_6 \mp \sqrt{3}\varepsilon_2),$
$\varepsilon_5^\pm = (1/2)(\pm\varepsilon_5 - \sqrt{3}\varepsilon_4), \varepsilon_4^\pm = (1/2)(\sqrt{3}\varepsilon_5 \pm \varepsilon_4), P_1^\pm = (1/2)(P_1 \pm \sqrt{3}P_2), P_2^\pm = (1/2)(\sqrt{3}P_1 \pm P_2)$

Table D.6 (continued)

$\bar{3}m \to 1$, $\bar{3}m \to \bar{1}(P=0)$, $32 \to 1$ (all six strains),
$\bar{3} \to \bar{1}(P=0)$, $\bar{3} \to 1$, $3 \to 1$ (strains 1–3 only) (above diagonal)
$3m \to 1$ (below diagonal)

S	1	2	3	4	5	6
1	N/A	R	R	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}a)^C$	$(11\bar{2}0)^N$ $(\bar{1}10c_+)^C$	$(1\bar{2}10)^N$ $(\bar{1}01c_-)^C$
2	R	N/A	R	$(11\bar{2}0)^N$ $(1\bar{1}0c_-)^C$	$(1\bar{2}10)^N$ $(10\bar{1}\bar{a})^C$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}b_+)^C$
3	R	R	N/A	$(1\bar{2}10)^N$ $(10\bar{1}c_+)^C$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}b_-)^C$	$(11\bar{2}0)^N$ $(\bar{1}10\bar{a})^C$
4	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}a)^N$	$(11\bar{2}0)^C$ $(1\bar{1}0c_-)^N$	$(1\bar{2}10)^C$ $(10\bar{1}c_+)^N$	N/A	R	R
5	$(11\bar{2}0)^C$ $(\bar{1}10c_+)^N$	$(1\bar{2}10)^C$ $(10\bar{1}\bar{a})^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}b_-)^N$	R	N/A	R
6	$(1\bar{2}10)^C$ $(\bar{1}01c_-)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}b_+)^N$	$(11\bar{2}0)^C$ $(\bar{1}10\bar{a})^N$	R	R	N/A

$a=\sqrt{3}(\varepsilon_5/\varepsilon_6), b_\pm = 2\sqrt{3}(\varepsilon_5 \pm \sqrt{3}\varepsilon_4)/[\pm\sqrt{3}(\varepsilon_1-\varepsilon_2)+\varepsilon_6], c_\pm = \mp(1/2)b_\pm$

Table D.7 Hexagonal to triclinic species

All species		$6/mmm \to 1$ $622 \to 1$ $6/mmm \to \bar{1}(P=0)$ $6/m \to 1$, $6/m \to \bar{1}(P=0)$ (strains 1–6 only) $6 \to 1$ (upper polarizations only, strains 1–6 only)	$6mm \to 1$	$\bar{6}m2 \to 1$ $\bar{6} \to 1$ (strains 1–6 only)
strains		polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$
2	$\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ \varepsilon_4^+ & \varepsilon_5^+ & \varepsilon_6^+ \end{pmatrix}$	$(P_1^- \quad P_2^+ \quad P_3)$ $(-P_1^- \quad -P_2^+ \quad -P_3)$	$(P_1^- \quad P_2^+ \quad P_3)$	$(-P_1^- \quad -P_2^+ \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ \varepsilon_4^- & \varepsilon_5^- & \varepsilon_6^- \end{pmatrix}$	$(-P_1^+ \quad P_2^- \quad P_3)$ $(P_1^+ \quad -P_2^- \quad -P_3)$	$(-P_1^+ \quad P_2^- \quad P_3)$	$(-P_1^+ \quad P_2^- \quad P_3)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & -\varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(-P_1 \quad -P_2 \quad P_3)$ $(P_1 \quad P_2 \quad -P_3)$	$(-P_1 \quad -P_2 \quad P_3)$	$(P_1 \quad P_2 \quad -P_3)$
5	$\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ -\varepsilon_4^+ & -\varepsilon_5^- & \varepsilon_6^+ \end{pmatrix}$	$(-P_1^- \quad -P_2^+ \quad P_3)$ $(P_1^- \quad P_2^+ \quad -P_3)$	$(-P_1^- \quad -P_2^+ \quad P_3)$	$(-P_1^- \quad -P_2^+ \quad P_3)$
6	$\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ -\varepsilon_4^- & -\varepsilon_5^- & \varepsilon_6^- \end{pmatrix}$	$(P_1^+ \quad -P_2^- \quad P_3)$ $(-P_1^+ \quad P_2^- \quad -P_3)$	$(P_1^+ \quad -P_2^- \quad P_3)$	$(-P_1^+ \quad P_2^- \quad -P_3)$
7	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_2 \quad -P_3)$ $(-P_1 \quad P_2 \quad P_3)$	$(-P_1 \quad P_2 \quad P_3)$	$(-P_1 \quad P_2 \quad P_3)$
8	$\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ \varepsilon_4^+ & -\varepsilon_5^+ & -\varepsilon_6^+ \end{pmatrix}$	$(P_1^- \quad -P_2^+ \quad -P_3)$ $(-P_1^- \quad P_2^+ \quad P_3)$	$(-P_1^- \quad P_2^+ \quad P_3)$	$(P_1^- \quad -P_2^+ \quad -P_3)$
9	$\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ \varepsilon_4^- & -\varepsilon_5^- & -\varepsilon_6^- \end{pmatrix}$	$(-P_1^+ \quad -P_2^- \quad -P_3)$ $(P_1^+ \quad P_2^- \quad P_3)$	$(P_1^+ \quad P_2^- \quad P_3)$	$(P_1^+ \quad P_2^- \quad P_3)$
10	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_2 \quad -P_3)$ $(P_1 \quad -P_2 \quad P_3)$	$(P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad P_2 \quad -P_3)$
11	$\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ -\varepsilon_4^+ & \varepsilon_5^+ & -\varepsilon_6^+ \end{pmatrix}$	$(-P_1^- \quad P_2^+ \quad -P_3)$ $(P_1^- \quad -P_2^+ \quad P_3)$	$(P_1^- \quad -P_2^+ \quad P_3)$	$(P_1^- \quad -P_2^+ \quad P_3)$
12	$\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ -\varepsilon_4^- & \varepsilon_5^- & -\varepsilon_6^- \end{pmatrix}$	$(P_1^+ \quad P_2^- \quad -P_3)$ $(-P_1^+ \quad -P_2^- \quad P_3)$	$(-P_1^+ \quad -P_2^- \quad P_3)$	$(P_1^+ \quad P_2^- \quad -P_3)$

$\varepsilon_1^\pm = (1/4)(\varepsilon_1 \pm \sqrt{3}\varepsilon_6 + 3\varepsilon_2), \varepsilon_2^\pm = (1/4)(3\varepsilon_1 \pm \sqrt{3}\varepsilon_6 + \varepsilon_2), \varepsilon_6^\pm = (1/2)(\pm\sqrt{3}\varepsilon_1 - \varepsilon_6 \mp \sqrt{3}\varepsilon_2),$
$\varepsilon_5^\pm = (1/2)(\pm\varepsilon_5 - \sqrt{3}\varepsilon_4), \varepsilon_4^\pm = (1/2)(\sqrt{3}\varepsilon_5 \pm \varepsilon_4), P_1^\pm = (1/2)(P_1 \pm \sqrt{3}P_2), P_2^\pm = (1/2)(\sqrt{3}P_1 \pm P_2)$

Table D.7 (continued)

$6/mmm \to \bar{1}(P=0)$, $6/mmm \to 1$, $622 \to 1$ (all 12 strains), $6/m \to \bar{1}(P=0)$, $6/m \to 1$, $6 \to 1$ (strains 1–6 only) (above diagonal)
$\bar{6}m2 \to 1$ (all 12 strains), $\bar{6} \to 1$ (strains 1–6 only) (below diagonal)

S	1	2	3	4	5	6	7	8	9	10	11	12
1	N/A	R	R	$(0001)^{N}$ $(2a_+a_-0)^{C}$	R	R	$(2\bar{1}\bar{1}0)^{N}$ $(01\bar{1}c)^{C}$	$(1\bar{1}00)^{N}$ $(11\bar{2}d_-)^{C}$	$(1\bar{2}10)^{N}$ $(10\bar{1}e_-)^{C}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}b)^{C}$	$(11\bar{2}0)^{N}$ $(1\bar{1}0e_+)^{C}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1d_+)^{C}$
2	R	N/A	R	R	$(0001)^{N}$ $(2g_+h_+0)^{C}$	R	$(10\bar{1}0)^{N}$ $(1\bar{2}1\bar{d}_-)^{C}$	$(2\bar{1}\bar{1}0)^{N}$ $(01\bar{1}e_-)^{C}$	$(1\bar{1}00)^{N}$ $(11\bar{2}b)^{C}$	$(1\bar{2}10)^{N}$ $(10\bar{1}e_+)^{C}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}d_+)^{C}$	$(11\bar{2}0)^{N}$ $(1\bar{1}0\bar{c})^{C}$
3	R	R	N/A	R	R	$(0001)^{N}$ $(2h_-g_-0)^{C}$	$(11\bar{2}0)^{N}$ $(1\bar{1}0\bar{e}_-)^{C}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1\bar{b})^{C}$	$(2\bar{1}\bar{1}0)^{N}$ $(01\bar{1}e_+)^{C}$	$(1\bar{1}00)^{N}$ $(11\bar{2}d_+)^{C}$	$(1\bar{2}10)^{N}$ $(10\bar{1}\bar{c})^{C}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}\bar{d}_-)^{C}$
4	$(0001)^{C}$ $(2a_+a_-0)^{N}$	R	R	N/A	R	R	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}\bar{b})^{C}$	$(11\bar{2}0)^{N}$ $(1\bar{1}0\bar{e}_+)^{C}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1\bar{d}_+)^{C}$	$(2\bar{1}\bar{1}0)^{N}$ $(01\bar{1}\bar{c})^{C}$	$(1\bar{1}00)^{N}$ $(11\bar{2}\bar{d}_-)^{C}$	$(1\bar{2}10)^{N}$ $(10\bar{1}\bar{e}_-)^{C}$
5	R	$(0001)^{C}$ $(2g_+h_+0)^{N}$	R	R	N/A	R	$(1\bar{2}10)^{N}$ $(10\bar{1}\bar{e}_+)^{C}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}\bar{d}_+)^{C}$	$(11\bar{2}0)^{N}$ $(1\bar{1}0c)^{C}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1d_-)^{C}$	$(2\bar{1}\bar{1}0)^{N}$ $(01\bar{1}\bar{e}_-)^{C}$	$(1\bar{1}00)^{N}$ $(11\bar{2}\bar{b})^{C}$
6	R	R	$(0001)^{C}$ $(2h_-g_-0)^{N}$	R	R	N/A	$(1\bar{1}00)^{N}$ $(11\bar{2}\bar{d}_+)^{C}$	$(1\bar{2}10)^{N}$ $(10\bar{1}c)^{C}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}d_-)^{C}$	$(11\bar{2}0)^{N}$ $(1\bar{1}0e_-)^{C}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1b)^{C}$	$(2\bar{1}\bar{1}0)^{N}$ $(01\bar{1}\bar{e}_+)^{C}$
7	$(2\bar{1}\bar{1}0)^{C}$ $(01\bar{1}c)^{N}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1\bar{d}_-)^{C}$	$(11\bar{2}0)^{C}$ $(1\bar{1}0\bar{e}_-)^{N}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}\bar{b})^{C}$	$(1\bar{2}10)^{C}$ $(10\bar{1}\bar{e}_+)^{N}$	$(1\bar{1}00)^{N}$ $(11\bar{2}\bar{d}_+)^{C}$	N/A	R	R	$(0001)^{N}$ $(2a_-a_+0)^{C}$	R	R
8	$(1\bar{1}00)^{N}$ $(11\bar{2}d_-)^{C}$	$(2\bar{1}\bar{1}0)^{C}$ $(01\bar{1}e_-)^{N}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1\bar{b})^{C}$	$(11\bar{2}0)^{C}$ $(1\bar{1}0\bar{e}_+)^{N}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}\bar{d}_+)^{C}$	$(1\bar{2}10)^{C}$ $(10\bar{1}c)^{N}$	R	N/A	R	R	$(0001)^{N}$ $(2h_+g_+0)^{C}$	R
9	$(1\bar{2}10)^{C}$ $(10\bar{1}e_-)^{N}$	$(1\bar{1}00)^{N}$ $(11\bar{2}b)^{C}$	$(2\bar{1}\bar{1}0)^{C}$ $(01\bar{1}e_+)^{N}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1\bar{d}_+)^{C}$	$(11\bar{2}0)^{C}$ $(1\bar{1}0c)^{N}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}d_-)^{C}$	R	R	N/A	R	R	$(0001)^{N}$ $(2g_-h_-0)^{C}$
10	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}b)^{C}$	$(1\bar{2}10)^{C}$ $(10\bar{1}e_+)^{N}$	$(1\bar{1}00)^{N}$ $(11\bar{2}d_+)^{C}$	$(2\bar{1}\bar{1}0)^{C}$ $(01\bar{1}\bar{c})^{N}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1d_-)^{C}$	$(11\bar{2}0)^{C}$ $(1\bar{1}0e_-)^{N}$	$(0001)^{C}$ $(2a_-a_+0)^{N}$	R	R	N/A	R	R
11	$(11\bar{2}0)^{C}$ $(1\bar{1}0e_+)^{N}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}d_+)^{C}$	$(1\bar{2}10)^{C}$ $(10\bar{1}\bar{c})^{N}$	$(1\bar{1}00)^{N}$ $(11\bar{2}\bar{d}_-)^{C}$	$(2\bar{1}\bar{1}0)^{C}$ $(01\bar{1}\bar{e}_-)^{N}$	$(10\bar{1}0)^{N}$ $(1\bar{2}1b)^{C}$	R	$(0001)^{C}$ $(2h_+g_+0)^{N}$	R	R	N/A	R
12	$(10\bar{1}0)^{N}$ $(1\bar{2}1d_+)^{C}$	$(11\bar{2}0)^{C}$ $(1\bar{1}0\bar{c})^{N}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}\bar{d}_-)^{C}$	$(1\bar{2}10)^{C}$ $(10\bar{1}\bar{e}_-)^{N}$	$(1\bar{1}00)^{N}$ $(11\bar{2}\bar{b})^{C}$	$(2\bar{1}\bar{1}0)^{C}$ $(01\bar{1}\bar{e}_+)^{N}$	R	R	$(0001)^{C}$ $(2g_-h_-0)^{N}$	R	R	N/A

Table D.7 (continued)

$6mm \to 1$

S	1	2	3	4	5	6	7	8	9	10	11	12
1	N/A	R	R	$(0001)^N$ $(2a_+a_-0)^C$	R	R	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}c)^N$	$(1\bar{1}00)^C$ $(11\bar{2}d_-)^N$	$(1\bar{2}10)^C$ $(10\bar{1}e_-)^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}b)^N$	$(11\bar{2}0)^C$ $(1\bar{1}0e_+)^N$	$(10\bar{1}0)^C$ $(1\bar{2}1d_+)^N$
2		N/A	R	R	$(0001)^N$ $(2g_+h_+0)^C$	R	$(10\bar{1}0)^C$ $(1\bar{2}1\bar{d}_-)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}e_-)^N$	$(1\bar{1}00)^C$ $(11\bar{2}b)^N$	$(1\bar{2}10)^C$ $(10\bar{1}e_+)^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}d_+)^N$	$(11\bar{2}0)^C$ $(1\bar{1}0\bar{c})^N$
3			N/A	R	R	$(0001)^N$ $(2h_-g_-0)^C$	$(11\bar{2}0)^C$ $(1\bar{1}0\bar{e}_-)^N$	$(10\bar{1}0)^C$ $(1\bar{2}1\bar{b})^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}e_+)^N$	$(1\bar{1}00)^C$ $(11\bar{2}d_+)^N$	$(1\bar{2}10)^C$ $(10\bar{1}\bar{c})^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}\bar{d}_-)^N$
4				N/A	R	R	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}\bar{b})^N$	$(11\bar{2}0)^C$ $(1\bar{1}0\bar{e}_+)^N$	$(10\bar{1}0)^C$ $(1\bar{2}1\bar{d}_+)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}\bar{c})^N$	$(1\bar{1}00)^C$ $(11\bar{2}\bar{d}_-)^N$	$(1\bar{2}10)^C$ $(10\bar{1}\bar{e}_-)^N$
5					N/A	R	$(1\bar{2}10)^C$ $(10\bar{1}\bar{e}_+)^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}\bar{d}_+)^N$	$(11\bar{2}0)^C$ $(1\bar{1}0c)^N$	$(10\bar{1}0)^C$ $(1\bar{2}1d_-)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}\bar{e}_-)^N$	$(1\bar{1}00)^C$ $(11\bar{2}\bar{b})^N$
6						N/A	$(1\bar{1}00)^C$ $(11\bar{2}\bar{d}_+)^N$	$(1\bar{2}10)^C$ $(10\bar{1}c)^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}d_-)^N$	$(11\bar{2}0)^C$ $(1\bar{1}0e_-)^N$	$(10\bar{1}0)^C$ $(1\bar{2}1b)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}\bar{e}_+)^N$
7							N/A	R	R	$(0001)^N$ $(2a_-a_+0)^C$	R	R
8								N/A	R	R	$(0001)^N$ $(2h_+g_+0)^C$	R
9									N/A	R	R	$(0001)^N$ $(2g_-h_-0)^C$
10										N/A	R	R
11											N/A	R
12												N/A

$a_\pm = -1 \pm \sqrt{3}(\varepsilon_4/\varepsilon_5), b = 3(\varepsilon_4/\varepsilon_6), c = \sqrt{3}(\varepsilon_5/\varepsilon_6)$, $d_\pm = \sqrt{3}(\sqrt{3}\varepsilon_5 \pm \varepsilon_4)/[\varepsilon_1 - \varepsilon_2 \mp (1/\sqrt{3})\varepsilon_6], e_\pm = (\varepsilon_5 \pm \sqrt{3}\varepsilon_4)/[\varepsilon_1 - \varepsilon_2 \pm (1/\sqrt{3})\varepsilon_6]$,
$g_\pm = 2(\varepsilon_5 \pm /(\varepsilon_5 \mp \sqrt{3}\varepsilon_4), h_\pm = -4\varepsilon_5/(\varepsilon_5 \mp \sqrt{3}\varepsilon_4)$

Table D.8 Cubic to triclinic

All species		$432 \to 1$ $23 \to 1$ (strains 1–12 only)	$\bar{4}3m \to 1$	$m\bar{3}m \to 1$, $m\bar{3}m \to \bar{1}(P=0)$ $m\bar{3} \to 1$, $m\bar{3} \to \bar{1}(P=0)$ (strains 1–12 only)
strains		polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$	$(P_1 \quad P_2 \quad P_3)$ $(-P_1 \quad -P_2 \quad -P_3)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & -\varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$	$(-P_1 \quad -P_2 \quad P_3)$ $(P_1 \quad P_2 \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_2 \quad -P_3)$	$(P_1 \quad -P_2 \quad -P_3)$	$(P_1 \quad -P_2 \quad -P_3)$ $(-P_1 \quad P_2 \quad P_3)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_2 \quad -P_3)$	$(-P_1 \quad P_2 \quad -P_3)$	$(-P_1 \quad P_2 \quad -P_3)$ $(P_1 \quad -P_2 \quad P_3)$
5	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ \varepsilon_6 & \varepsilon_4 & \varepsilon_5 \end{pmatrix}$	$(P_3 \quad P_1 \quad P_2)$	$(P_3 \quad P_1 \quad P_2)$	$(P_3 \quad P_1 \quad P_2)$ $(-P_3 \quad -P_1 \quad -P_2)$
6	$\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ \varepsilon_5 & \varepsilon_6 & \varepsilon_4 \end{pmatrix}$	$(P_2 \quad P_3 \quad P_1)$	$(P_2 \quad P_3 \quad P_1)$	$(P_2 \quad P_3 \quad P_1)$ $(-P_2 \quad -P_3 \quad -P_1)$
7	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ -\varepsilon_6 & -\varepsilon_4 & \varepsilon_5 \end{pmatrix}$	$(-P_3 \quad -P_1 \quad P_2)$	$(-P_3 \quad -P_1 \quad P_2)$	$(-P_3 \quad -P_1 \quad P_2)$ $(P_3 \quad P_1 \quad -P_2)$
8	$\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ -\varepsilon_5 & -\varepsilon_6 & \varepsilon_4 \end{pmatrix}$	$(-P_2 \quad -P_3 \quad P_1)$	$(-P_2 \quad -P_3 \quad P_1)$	$(-P_2 \quad -P_3 \quad P_1)$ $(P_2 \quad P_3 \quad -P_1)$
9	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ \varepsilon_6 & -\varepsilon_4 & -\varepsilon_5 \end{pmatrix}$	$(P_3 \quad -P_1 \quad -P_2)$	$(P_3 \quad -P_1 \quad -P_2)$	$(P_3 \quad -P_1 \quad -P_2)$ $(-P_3 \quad P_1 \quad P_2)$
10	$\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ \varepsilon_5 & -\varepsilon_6 & -\varepsilon_4 \end{pmatrix}$	$(P_2 \quad -P_3 \quad -P_1)$	$(P_2 \quad -P_3 \quad -P_1)$	$(P_2 \quad -P_3 \quad -P_1)$ $(-P_2 \quad P_3 \quad P_1)$
11	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ -\varepsilon_6 & \varepsilon_4 & -\varepsilon_5 \end{pmatrix}$	$(-P_3 \quad P_1 \quad -P_2)$	$(-P_3 \quad P_1 \quad -P_2)$	$(-P_3 \quad P_1 \quad -P_2)$ $(P_3 \quad -P_1 \quad P_2)$
12	$\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ -\varepsilon_5 & \varepsilon_6 & -\varepsilon_4 \end{pmatrix}$	$(-P_2 \quad P_3 \quad -P_1)$	$(-P_2 \quad P_3 \quad -P_1)$	$(-P_2 \quad P_3 \quad -P_1)$ $(P_2 \quad -P_3 \quad P_1)$

Table D.8 (continued)

All species		$432 \to 1$ $23 \to 1$ (strains 1–12 only)	$\bar{4}3m \to 1$	$m\bar{3}m \to 1$, $m\bar{3}m \to \bar{1}(P=0)$ $m\bar{3} \to 1$, $m\bar{3} \to \bar{1}(P=0)$ (strains 1–12 only)
strains		polarizations	polarizations	polarizations
13	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & -\varepsilon_4 & -\varepsilon_6 \end{pmatrix}$	$(-P_2 \quad P_1 \quad P_3)$	$(P_2 \quad -P_1 \quad -P_3)$	$(-P_2 \quad P_1 \quad P_3)$ $(P_2 \quad -P_1 \quad -P_3)$
14	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & \varepsilon_4 & -\varepsilon_6 \end{pmatrix}$	$(P_2 \quad -P_1 \quad P_3)$	$(-P_2 \quad P_1 \quad -P_3)$	$(P_2 \quad -P_1 \quad P_3)$ $(-P_2 \quad P_1 \quad -P_3)$
15	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_2 \\ -\varepsilon_4 & \varepsilon_6 & -\varepsilon_5 \end{pmatrix}$	$(P_1 \quad -P_3 \quad P_2)$	$(-P_1 \quad P_3 \quad -P_2)$	$(P_1 \quad -P_3 \quad P_2)$ $(-P_1 \quad P_3 \quad -P_2)$
16	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_2 \\ -\varepsilon_4 & -\varepsilon_6 & \varepsilon_5 \end{pmatrix}$	$(P_1 \quad P_3 \quad -P_2)$	$(-P_1 \quad -P_3 \quad P_2)$	$(P_1 \quad P_3 \quad -P_2)$ $(-P_1 \quad -P_3 \quad P_2)$
17	$\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ \varepsilon_6 & -\varepsilon_5 & -\varepsilon_4 \end{pmatrix}$	$(-P_3 \quad P_2 \quad P_1)$	$(P_3 \quad -P_2 \quad -P_1)$	$(-P_3 \quad P_2 \quad P_1)$ $(P_3 \quad -P_2 \quad -P_1)$
18	$\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ -\varepsilon_6 & -\varepsilon_5 & \varepsilon_4 \end{pmatrix}$	$(P_3 \quad P_2 \quad -P_1)$	$(-P_3 \quad -P_2 \quad P_1)$	$(P_3 \quad P_2 \quad -P_1)$ $(-P_3 \quad -P_2 \quad P_1)$
19	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & -\varepsilon_4 & \varepsilon_6 \end{pmatrix}$	$(P_2 \quad P_1 \quad -P_3)$	$(-P_2 \quad -P_1 \quad P_3)$	$(P_2 \quad P_1 \quad -P_3)$ $(-P_2 \quad -P_1 \quad P_3)$
20	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & \varepsilon_4 & \varepsilon_6 \end{pmatrix}$	$(-P_2 \quad -P_1 \quad -P_3)$	$(P_2 \quad P_1 \quad P_3)$	$(-P_2 \quad -P_1 \quad -P_3)$ $(P_2 \quad P_1 \quad P_3)$
21	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_2 \\ \varepsilon_4 & -\varepsilon_6 & -\varepsilon_5 \end{pmatrix}$	$(-P_1 \quad P_3 \quad P_2)$	$(P_1 \quad -P_3 \quad -P_2)$	$(-P_1 \quad P_3 \quad P_2)$ $(P_1 \quad -P_3 \quad -P_2)$
22	$\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ -\varepsilon_6 & \varepsilon_5 & -\varepsilon_4 \end{pmatrix}$	$(P_3 \quad -P_2 \quad P_1)$	$(-P_3 \quad P_2 \quad -P_1)$	$(P_3 \quad -P_2 \quad P_1)$ $(-P_3 \quad P_2 \quad -P_1)$
23	$\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ \varepsilon_6 & \varepsilon_5 & \varepsilon_4 \end{pmatrix}$	$(-P_3 \quad -P_2 \quad -P_1)$	$(P_3 \quad P_2 \quad P_1)$	$(-P_3 \quad -P_2 \quad -P_1)$ $(P_3 \quad P_2 \quad P_1)$

Table D.8 (continued)

$432 \rightarrow 1$, $m\bar{3}m \rightarrow 1$, $m\bar{3}m \rightarrow \bar{1}(P=0)$ (all 24 strains), $23 \rightarrow 1$, $m\bar{3} \rightarrow 1$, $m\bar{3} \rightarrow \bar{1}(P=0)$ (strains 1–12 only) (above diagonal)
$\bar{4}3m \rightarrow 1$ (below diagonal)

S	1	2	3	4	5	6	7	8	9	10	11	12
1	N/A	$(001)^{N}$ $(1b0)^{C}$	$(100)^{N}$ $(01c)^{C}$	$(010)^{N}$ $(10a)^{C}$	R	R	R	R	R	R	R	R
2	$(001)^{N}$ $(1b0)^{C}$	N/A	$(010)^{N}$ $(10\bar{a})^{C}$	$(100)^{N}$ $(01\bar{c})^{C}$	R	R	R	R	R	R	R	R
3	$(100)^{N}$ $(01c)^{C}$	$(010)^{N}$ $(10\bar{a})^{C}$	N/A	$(001)^{N}$ $(1\bar{b}0)^{C}$	R	R	R	R	R	R	R	R
4	$(010)^{N}$ $(10a)^{C}$	$(100)^{N}$ $(01\bar{c})^{C}$	$(001)^{N}$ $(1\bar{b}0)^{C}$	N/A	R	R	R	R	R	R	R	R
5	R	R	R	R	N/A	R	$(001)^{N}$ $(a10)^{C}$	R	$(100)^{N}$ $(01b)^{C}$	R	$(010)^{N}$ $(c01)^{C}$	R
6	R	R	R	R	R	N/A	R	$(001)^{N}$ $(1c0)^{C}$	R	$(100)^{N}$ $(0a1)^{C}$	R	$(010)^{N}$ $(b01)^{C}$
7	R	R	R	R	$(001)^{N}$ $(a10)^{C}$	R	N/A	R	$(010)^{N}$ $(\bar{c}01)^{C}$	R	$(100)^{N}$ $(01\bar{b})^{C}$	R
8	R	R	R	R	R	$(001)^{N}$ $(1c0)^{C}$	R	N/A	R	$(010)^{N}$ $(\bar{b}01)^{C}$	R	$(100)^{N}$ $(0\bar{a}1)^{C}$
9	R	R	R	R	$(100)^{N}$ $(01b)^{C}$	R	$(010)^{N}$ $(\bar{c}01)^{C}$	R	N/A	R	$(001)^{N}$ $(\bar{a}10)^{C}$	R
10	R	R	R	R	R	$(100)^{N}$ $(0a1)^{C}$	R	$(010)^{N}$ $(\bar{b}01)^{C}$	R	N/A	R	$(001)^{N}$ $(1\bar{c}0)^{C}$
11	R	R	R	R	$(010)^{N}$ $(c01)^{C}$	R	$(100)^{N}$ $(01\bar{b})^{C}$	R	$(001)^{N}$ $(\bar{a}10)^{C}$	R	N/A	R
12	R	R	R	R	R	$(010)^{N}$ $(b01)^{C}$	R	$(100)^{N}$ $(0\bar{a}1)^{C}$	R	$(001)^{N}$ $(1\bar{c}0)^{C}$	R	N/A

Table D.8 (continued)

S	13	14	15	16	17	18	19	20	21	22	23	24
1	R	R	R	R	R	R	$(110)^{\mathrm{N}}$ $(1\bar{1}d_{+})^{\mathrm{C}}$	$(1\bar{1}0)^{\mathrm{N}}$ $(11d_{-})^{\mathrm{C}}$	$(011)^{\mathrm{N}}$ $(\bar{f}_{+}1\bar{1})^{\mathrm{C}}$	$(101)^{\mathrm{N}}$ $(1\bar{e}_{+}\bar{1})^{\mathrm{C}}$	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{e}_{-}1)^{\mathrm{C}}$	$(01\bar{1})^{\mathrm{N}}$ $(\bar{f}_{-}11)^{\mathrm{C}}$
2	R	R	$(01\bar{1})^{\mathrm{N}}$ $(\bar{f}_{+}11)^{\mathrm{C}}$	$(011)^{\mathrm{N}}$ $(\bar{f}_{-}1\bar{1})^{\mathrm{C}}$	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{e}_{+}1)^{\mathrm{C}}$	$(101)^{\mathrm{N}}$ $(1\bar{e}_{-}\bar{1})^{\mathrm{C}}$	$(1\bar{1}0)^{\mathrm{N}}$ $(11\bar{d}_{-})^{\mathrm{C}}$	$(110)^{\mathrm{N}}$ $(1\bar{1}d_{+})^{\mathrm{C}}$	R	R	R	R
3	$(110)^{\mathrm{N}}$ $(1\bar{1}\bar{d}_{-})^{\mathrm{C}}$	$(1\bar{1}0)^{\mathrm{N}}$ $(11d_{+})^{\mathrm{C}}$	R	R	$(101)^{\mathrm{N}}$ $(1e_{-}\bar{1})^{\mathrm{C}}$	$(10\bar{1})^{\mathrm{N}}$ $(1e_{+}1)^{\mathrm{C}}$	R	R	$(01\bar{1})^{\mathrm{N}}$ $(f_{-}11)^{\mathrm{C}}$	R	R	$(011)^{\mathrm{N}}$ $(f_{+}1\bar{1})^{\mathrm{C}}$
4	$(1\bar{1}0)^{\mathrm{N}}$ $(11\bar{d}_{+})^{\mathrm{C}}$	$(110)^{\mathrm{N}}$ $(1\bar{1}d_{-})^{\mathrm{C}}$	$(011)^{\mathrm{N}}$ $(f_{-}1\bar{1})^{\mathrm{C}}$	$(01\bar{1})^{\mathrm{N}}$ $(f_{+}11)^{\mathrm{C}}$	R	R	R	R	R	$(10\bar{1})^{\mathrm{N}}$ $(1e_{-}1)^{\mathrm{C}}$	$(101)^{\mathrm{N}}$ $(1e_{+}\bar{1})^{\mathrm{C}}$	R
5	R	$(101)^{\mathrm{N}}$ $(1f_{+}\bar{1})^{\mathrm{C}}$	R	$(110)^{\mathrm{N}}$ $(1\bar{1}e_{+})^{\mathrm{C}}$	$(011)^{\mathrm{N}}$ $(\bar{d}_{+}1\bar{1})^{\mathrm{C}}$	R	R	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{f}_{-}1)^{\mathrm{C}}$	R	R	$(01\bar{1})^{\mathrm{N}}$ $(\bar{d}_{-}11)^{\mathrm{C}}$	$(1\bar{1}0)^{\mathrm{N}}$ $(11\bar{e}_{-})^{\mathrm{C}}$
6	$(011)^{\mathrm{N}}$ $(e_{+}1\bar{1})^{\mathrm{C}}$	R	$(101)^{\mathrm{N}}$ $(1d_{+}\bar{1})^{\mathrm{C}}$	R	R	$(110)^{\mathrm{N}}$ $(1\bar{1}\bar{f}_{+})^{\mathrm{C}}$	R	$(01\bar{1})^{\mathrm{N}}$ $(\bar{e}_{-}11)^{\mathrm{C}}$	R	R	$(1\bar{1}0)^{\mathrm{N}}$ $(11\bar{f}_{-})^{\mathrm{C}}$	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{d}_{-}1)^{\mathrm{C}}$
7	$(10\bar{1})^{\mathrm{N}}$ $(1f_{+}1)^{\mathrm{C}}$	R	R	$(1\bar{1}0)^{\mathrm{N}}$ $(11e_{-})^{\mathrm{C}}$	R	$(011)^{\mathrm{N}}$ $(\bar{d}_{-}1\bar{1})^{\mathrm{C}}$	$(101)^{\mathrm{N}}$ $(1\bar{f}_{-}\bar{1})^{\mathrm{C}}$	R	R	$(01\bar{1})^{\mathrm{N}}$ $(\bar{d}_{+}11)^{\mathrm{C}}$	R	$(110)^{\mathrm{N}}$ $(1\bar{1}\bar{e}_{+})^{\mathrm{C}}$
8	R	$(01\bar{1})^{\mathrm{N}}$ $(e_{+}11)^{\mathrm{C}}$	R	$(101)^{\mathrm{N}}$ $(1\bar{d}_{-}\bar{1})^{\mathrm{C}}$	R	$(1\bar{1}0)^{\mathrm{N}}$ $(11f_{-})^{\mathrm{C}}$	$(011)^{\mathrm{N}}$ $(\bar{e}_{-}1\bar{1})^{\mathrm{C}}$	R	$(10\bar{1})^{\mathrm{N}}$ $(1d_{+}1)^{\mathrm{C}}$	R	$(110)^{\mathrm{N}}$ $(1\bar{1}f_{+})^{\mathrm{C}}$	R
9	$(101)^{\mathrm{N}}$ $(1f_{+}\bar{1})^{\mathrm{C}}$	R	$(1\bar{1}0)^{\mathrm{N}}$ $(11\bar{e}_{+})^{\mathrm{C}}$	R	$(01\bar{1})^{\mathrm{N}}$ $(d_{+}11)^{\mathrm{C}}$	R	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{f}_{+}1)^{\mathrm{C}}$	R	$(110)^{\mathrm{N}}$ $(1\bar{1}e_{-})^{\mathrm{C}}$	R	$(011)^{\mathrm{N}}$ $(d_{+}1\bar{1})^{\mathrm{C}}$	R
10	$(01\bar{1})^{\mathrm{N}}$ $(e_{-}11)^{\mathrm{C}}$	R	R	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{d}_{+}1)^{\mathrm{C}}$	$(110)^{\mathrm{N}}$ $(1\bar{1}f_{-})^{\mathrm{C}}$	R	R	$(011)^{\mathrm{N}}$ $(\bar{e}_{+}1\bar{1})^{\mathrm{C}}$	$(101)^{\mathrm{N}}$ $(1d_{-}\bar{1})^{\mathrm{C}}$	$(1\bar{1}0)^{\mathrm{N}}$ $(11f_{+})^{\mathrm{C}}$	R	R
11	R	$(10\bar{1})^{\mathrm{N}}$ $(1f_{-}1)^{\mathrm{C}}$	$(110)^{\mathrm{N}}$ $(1\bar{1}\bar{e}_{-})^{\mathrm{C}}$	R	R	$(01\bar{1})^{\mathrm{N}}$ $(d_{+}11)^{\mathrm{C}}$	R	$(101)^{\mathrm{N}}$ $(1\bar{f}_{+}\bar{1})^{\mathrm{C}}$	$(1\bar{1}0)^{\mathrm{N}}$ $(11e_{+})^{\mathrm{C}}$	$(011)^{\mathrm{N}}$ $(d_{-}1\bar{1})^{\mathrm{C}}$	R	R
12	R	$(011)^{\mathrm{N}}$ $(e_{-}1\bar{1})^{\mathrm{C}}$	$(10\bar{1})^{\mathrm{N}}$ $(1\bar{d}_{-}1)^{\mathrm{C}}$	R	$(1\bar{1}0)^{\mathrm{N}}$ $(11\bar{f}_{+})^{\mathrm{C}}$	R	$(01\bar{1})^{\mathrm{N}}$ $(\bar{e}_{+}11)^{\mathrm{C}}$	R	R	$(110)^{\mathrm{N}}$ $(1\bar{1}\bar{f}_{-})^{\mathrm{C}}$	R	$(101)^{\mathrm{N}}$ $(1\bar{d}_{+}\bar{1})^{\mathrm{C}}$

Table D.8 (continued)

S	1	2	3	4	5	6	7	8	9	10	11	12
13	R	R	$(110)^{C}$ $(1\bar{1}\bar{d}_{-})^{N}$	$(1\bar{1}0)^{C}$ $(11\bar{d}_{+})^{N}$	R	$(011)^{C}$ $(e_{+}1\bar{1})^{N}$	$(10\bar{1})^{C}$ $(1f_{+}1)^{N}$	R	$(101)^{C}$ $(1f_{+}\bar{1})^{N}$	$(01\bar{1})^{C}$ $(e_{-}11)^{N}$	R	R
14	R	R	$(1\bar{1}0)^{C}$ $(11d_{+})^{N}$	$(110)^{C}$ $(1\bar{1}d_{-})^{N}$	$(101)^{C}$ $(1f_{+}\bar{1})^{N}$	R	R	$(01\bar{1})^{C}$ $(e_{+}11)^{N}$	R	R	$(10\bar{1})^{C}$ $(1f_{-}1)^{N}$	$(011)^{C}$ $(e_{-}1\bar{1})^{N}$
15	R	$(01\bar{1})^{C}$ $(\bar{f}_{+}11)^{N}$	R	$(011)^{C}$ $(f_{-}1\bar{1})^{N}$	R	$(101)^{C}$ $(1d_{+}\bar{1})^{N}$	R	R	$(1\bar{1}0)^{C}$ $(11\bar{e}_{+})^{N}$	R	$(110)^{C}$ $(1\bar{1}\bar{e}_{-})^{N}$	$(10\bar{1})^{C}$ $(1\bar{d}_{-}1)^{N}$
16	R	$(011)^{C}$ $(\bar{f}_{-}1\bar{1})^{N}$	R	$(01\bar{1})^{C}$ $(f_{+}11)^{N}$	$(110)^{C}$ $(1\bar{1}e_{+})^{N}$	R	$(1\bar{1}0)^{C}$ $(11e_{-})^{N}$	$(101)^{C}$ $(1\bar{d}_{-}\bar{1})^{N}$	R	$(10\bar{1})^{C}$ $(1\bar{d}_{+}1)^{N}$	R	R
17	R	$(10\bar{1})^{C}$ $(1\bar{e}_{+}1)^{N}$	$(101)^{C}$ $(1e_{-}\bar{1})^{N}$	R	$(011)^{C}$ $(\bar{d}_{+}1\bar{1})^{N}$	R	R	R	$(01\bar{1})^{C}$ $(d_{+}11)^{N}$	$(110)^{C}$ $(1\bar{1}f_{-})^{N}$	R	$(1\bar{1}0)^{C}$ $(11\bar{f}_{+})^{N}$
18	R	$(101)^{C}$ $(1\bar{e}_{-}\bar{1})^{N}$	$(10\bar{1})^{C}$ $(1e_{+}1)^{N}$	R	R	$(110)^{C}$ $(1\bar{1}\bar{f}_{+})^{N}$	$(011)^{C}$ $(\bar{d}_{-}1\bar{1})^{N}$	$(1\bar{1}0)^{C}$ $(11f_{-})^{N}$	R	R	$(01\bar{1})^{C}$ $(d_{+}11)^{N}$	R
19	$(110)^{C}$ $(1\bar{1}d_{+})^{N}$	$(1\bar{1}0)^{C}$ $(11\bar{d}_{-})^{N}$	R	R	R	R	$(101)^{C}$ $(1\bar{f}_{-}\bar{1})^{N}$	$(011)^{C}$ $(\bar{e}_{-}1\bar{1})^{N}$	$(10\bar{1})^{C}$ $(1\bar{f}_{+}1)^{N}$	R	R	$(01\bar{1})^{C}$ $(\bar{e}_{+}11)^{N}$
20	$(1\bar{1}0)^{C}$ $(11d_{-})^{N}$	$(110)^{C}$ $(1\bar{1}d_{+})^{N}$	R	R	$(10\bar{1})^{C}$ $(1\bar{f}_{-}1)^{N}$	$(01\bar{1})^{C}$ $(\bar{e}_{-}11)^{N}$	R	R	R	$(011)^{C}$ $(\bar{e}_{+}1\bar{1})^{N}$	$(101)^{C}$ $(1\bar{f}_{+}\bar{1})^{N}$	R
21	$(011)^{C}$ $(\bar{f}_{+}1\bar{1})^{N}$	R	$(01\bar{1})^{C}$ $(f_{-}11)^{N}$	R	R	R	R	$(10\bar{1})^{C}$ $(1d_{+}1)^{N}$	$(110)^{C}$ $(1\bar{1}e_{-})^{N}$	$(101)^{C}$ $(1d_{-}\bar{1})^{N}$	$(1\bar{1}0)^{C}$ $(11e_{+})^{N}$	R
22	$(101)^{C}$ $(1\bar{e}_{+}\bar{1})^{N}$	R	R	$(10\bar{1})^{C}$ $(1e_{-}1)^{N}$	R	R	$(01\bar{1})^{C}$ $(\bar{d}_{+}11)^{N}$	R	R	$(1\bar{1}0)^{C}$ $(11f_{+})^{N}$	$(011)^{C}$ $(d_{-}1\bar{1})^{N}$	$(110)^{C}$ $(1\bar{1}\bar{f}_{-})^{N}$
23	$(10\bar{1})^{C}$ $(1\bar{e}_{-}1)^{N}$	R	R	$(101)^{C}$ $(1e_{+}\bar{1})^{N}$	$(01\bar{1})^{C}$ $(\bar{d}_{-}11)^{N}$	$(1\bar{1}0)^{C}$ $(11\bar{f}_{-})^{N}$	R	$(110)^{C}$ $(1\bar{1}f_{+})^{N}$	$(011)^{C}$ $(d_{+}1\bar{1})^{N}$	R	R	R
24	$(01\bar{1})^{C}$ $(\bar{f}_{-}11)^{N}$	R	$(011)^{C}$ $(f_{+}1\bar{1})^{N}$	R	$(1\bar{1}0)^{C}$ $(11\bar{e}_{-})^{N}$	$(10\bar{1})^{C}$ $(1\bar{d}_{-}1)^{N}$	$(110)^{C}$ $(1\bar{1}\bar{e}_{+})^{N}$	R	R	R	R	$(101)^{C}$ $(1\bar{d}_{+}\bar{1})^{N}$

Table D.8 (continued)

S	13	14	15	16	17	18	19	20	21	22	23	24
13	N/A	$(001)^{N}$ $(\bar{b}10)^{C}$	R	R	R	R	$(010)^{N}$ $(10\bar{c})^{C}$	$(100)^{N}$ $(01a)^{C}$	R	R	R	R
14	$(001)^{N}$ $(\bar{b}10)^{C}$	N/A	R	R	R	R	$(100)^{N}$ $(01\bar{a})^{C}$	$(010)^{N}$ $(10c)^{C}$	R	R	R	R
15	R	R	N/A	$(100)^{N}$ $(0\bar{c}1)^{C}$	R	R	R	R	$(001)^{N}$ $(1\bar{a}0)^{C}$	R	R	$(010)^{N}$ $(10b)^{C}$
16	R	R	$(100)^{N}$ $(0\bar{c}1)^{C}$	N/A	R	R	R	R	$(010)^{N}$ $(10\bar{b})^{C}$	R	R	$(001)^{N}$ $(1a0)^{C}$
17	R	R	R	R	N/A	$(010)^{N}$ $(\bar{a}01)^{C}$	R	R	R	$(001)^{N}$ $(\bar{c}10)^{C}$	$(100)^{N}$ $(0b1)^{C}$	R
18	R	R	R	R	$(010)^{N}$ $(\bar{a}01)^{C}$	N/A	R	R	R	$(100)^{N}$ $(0\bar{b}1)^{C}$	$(001)^{N}$ $(c10)^{C}$	R
19	$(010)^{N}$ $(10\bar{c})^{C}$	$(100)^{N}$ $(01\bar{a})^{C}$	R	R	R	R	N/A	$(001)^{N}$ $(b10)^{C}$	R	R	R	R
20	$(100)^{N}$ $(01a)^{C}$	$(010)^{N}$ $(10c)^{C}$	R	R	R	R	$(001)^{N}$ $(b10)^{C}$	N/A	R	R	R	R
21	R	R	$(001)^{N}$ $(1\bar{a}0)^{C}$	$(010)^{N}$ $(10\bar{b})^{C}$	R	R	R	R	N/A	R	R	$(100)^{N}$ $(0c1)^{C}$
22	R	R	R	R	$(001)^{N}$ $(\bar{c}10)^{C}$	$(100)^{N}$ $(0\bar{b}1)^{C}$	R	R	R	N/A	$(010)^{N}$ $(a01)^{C}$	R
23	R	R	R	R	$(100)^{N}$ $(0b1)^{C}$	$(001)^{N}$ $(c10)^{C}$	R	R	R	$(010)^{N}$ $(a01)^{C}$	N/A	R
24	R	R	$(010)^{N}$ $(10b)^{C}$	$(001)^{N}$ $(1a0)^{C}$	R	R	R	R	$(100)^{N}$ $(0c1)^{C}$	R	R	N/A

$a = \varepsilon_4/\varepsilon_6, b = \varepsilon_4/\varepsilon_5, c = \varepsilon_5/\varepsilon_6, d_\pm = (\varepsilon_4 \pm \varepsilon_5)/[2(\varepsilon_2 - \varepsilon_1)], e_\pm = (\varepsilon_6 \pm \varepsilon_4)/[2(\varepsilon_3 - \varepsilon_1)], f_\pm = (\varepsilon_6 \pm \varepsilon_5)/[2(\varepsilon_3 - \varepsilon_2)]$

Table D.9 Monoclinic to monoclinic

All species		$2/m \rightarrow m$	$2/m \rightarrow 2$
strains		polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & \varepsilon_5 & 0 \end{pmatrix}$	$(P_1 \quad 0 \quad P_3)$ $(-P_1 \quad 0 \quad -P_3)$	$(0 \quad P_2 \quad 0)$ $(0 \quad -P_2 \quad 0)$

Table D.10 Orthorhombic to monoclinic

All species		$mmm \rightarrow m_x$ $mm2 \rightarrow m_x$(upper polarizations only)	$mmm \rightarrow 2_x$ $mmm \rightarrow 2_x/m_x (P = 0)$ $222 \rightarrow 2_x$ (upper polarizations only)
strains		polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & 0 & 0 \end{pmatrix}$	$(0 \quad P_2 \quad P_3)$ $(0 \quad -P_2 \quad -P_3)$	$(P_1 \quad 0 \quad 0)$ $(-P_1 \quad 0 \quad 0)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & 0 & 0 \end{pmatrix}$	$(0 \quad -P_2 \quad P_3)$ $(0 \quad P_2 \quad -P_3)$	$(-P_1 \quad 0 \quad 0)$ $(P_1 \quad 0 \quad 0)$

S	1	2
1	N/A	$(010)^{C}$ $(001)^{N}$
2	$(010)^{N}$ $(001)^{N}$	N/A

Table D.11 Orthorhombic to monoclinic

Species		$mm2 \rightarrow 2_z$
strains		polarization
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$

S	1	2
1	N/A	$(100)^{N}$ $(010)^{N}$
2		N/A

Table D.12 Tetragonal to monoclinic

All species	$4mm \to m_x$	$4/mmm \to 2_x$ $4/mmm \to 2_x/m_x (P = 0)$ $422 \to 2_x$(upper polarizations only)	$\bar{4}2m \to 2_x$	$4/mmm \to m_x$
strains	polarizations	polarizations	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & 0 & 0 \end{pmatrix}$	$(0 \quad P_2 \quad P_3)$	$(P_1 \quad 0 \quad 0)$ $(-P_1 \quad 0 \quad 0)$	$(P_1 \quad 0 \quad 0)$	$(0 \quad P_2 \quad P_3)$ $(0 \quad -P_2 \quad -P_3)$
2 $\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ 0 & -\varepsilon_4 & 0 \end{pmatrix}$	$(-P_2 \quad 0 \quad P_3)$	$(0 \quad P_1 \quad 0)$ $(0 \quad -P_1 \quad 0)$	$(0 \quad -P_1 \quad 0)$	$(-P_2 \quad 0 \quad P_3)$ $(P_2 \quad 0 \quad -P_3)$
3 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & 0 & 0 \end{pmatrix}$	$(0 \quad -P_2 \quad P_3)$	$(-P_1 \quad 0 \quad 0)$ $(P_1 \quad 0 \quad 0)$	$(-P_1 \quad 0 \quad 0)$	$(0 \quad -P_2 \quad P_3)$ $(0 \quad P_2 \quad -P_3)$
4 $\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ 0 & \varepsilon_4 & 0 \end{pmatrix}$	$(P_2 \quad 0 \quad P_3)$	$(0 \quad -P_1 \quad 0)$ $(0 \quad P_1 \quad 0)$	$(0 \quad P_1 \quad 0)$	$(P_2 \quad 0 \quad P_3)$ $(-P_2 \quad 0 \quad -P_3)$

$4mm \to m_x$; $4/mmm \to m_x$ (above diagonal)
$4/mmm \to 2_x$, $4/mmm \to 2_x/m_x (P = 0)$, $422 \to 2_x$ (below diagonal)

S	1	2	3	4
1	N/A	$(110)^C$ $(1\bar{1}\bar{a})^N$	$(010)^C$ $(001)^N$	$(1\bar{1}0)^C$ $(11a)^N$
2	$(110)^N$ $(1\bar{1}\bar{a})^C$	N/A	$(1\bar{1}0)^C$ $(11\bar{a})^N$	$(100)^C$ $(001)^N$
3	$(010)^N$ $(001)^N$	$(1\bar{1}0)^N$ $(11\bar{a})^C$	N/A	$(110)^C$ $(1\bar{1}a)^N$
4	$(1\bar{1}0)^N$ $(11a)^C$	$(100)^N$ $(001)^N$	$(110)^N$ $(1\bar{1}a)^C$	N/A

$\bar{4}2m \to 2_x$.

S	1	2	3	4
1	N/A	$(110)^C$ $(1\bar{1}\bar{a})^N$	$(010)^N$ $(001)^N$	$(1\bar{1}0)^C$ $(11a)^N$
2		N/A	$(1\bar{1}0)^C$ $(11\bar{a})^N$	$(100)^N$ $(001)^N$
3			N/A	$(110)^C$ $(1\bar{1}a)^N$
4				N/A

$a = \varepsilon_4/(\varepsilon_2 - \varepsilon_1)$

Table D.13 Tetragonal to monoclinic

All species	$4/mmm \to 2_z$ $4/mmm \to 2_z/m_z (P=0)$ $4\,mm \to 2_z$(upper polarizations only) $4/m \to 2_z$(strains 1–2 only) $4 \to 2_z$ (strains 1–2 only, upper polarizations only)	$4/mmm \to m_z$ $4/m \to m_z$(strains 1-2 only) $4/m \to 2_z/m_z (P=0)$ (strains 1–2 only)	$\bar{4}2m \to 2_z$ $\bar{4} \to 2_z$ (strains 1–2 only)	$422 \to 2_z$
strains	polarizations	polarizations	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \;\; 0 \;\; P_3)$ $(0 \;\; 0 \;\; -P_3)$	$(P_1 \;\; P_2 \;\; 0)$ $(-P_1 \;\; -P_2 \;\; 0)$	$(0 \;\; 0 \;\; P_3)$	$(0 \;\; 0 \;\; P_3)$
2 $\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \;\; 0 \;\; P_3)$ $(0 \;\; 0 \;\; -P_3)$	$(-P_2 \;\; P_1 \;\; 0)$ $(P_2 \;\; -P_1 \;\; 0)$	$(0 \;\; 0 \;\; -P_3)$	$(0 \;\; 0 \;\; P_3)$
3 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \;\; 0 \;\; P_3)$ $(0 \;\; 0 \;\; -P_3)$	$(P_1 \;\; -P_2 \;\; 0)$ $(-P_1 \;\; P_2 \;\; 0)$	$(0 \;\; 0 \;\; -P_3)$	$(0 \;\; 0 \;\; -P_3)$
4 $\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \;\; 0 \;\; P_3)$ $(0 \;\; 0 \;\; -P_3)$	$(P_2 \;\; P_1 \;\; 0)$ $(-P_2 \;\; -P_1 \;\; 0)$	$(0 \;\; 0 \;\; P_3)$	$(0 \;\; 0 \;\; -P_3)$

Table D.13 (continued)

$4/mmm \rightarrow 2_z$, $4/mmm \rightarrow 2_z/m_z(P=0)$, $4mm \rightarrow 2_z$, $\bar{4}2m \rightarrow 2_z$, $422 \rightarrow 2_z$ (all four strains), $4/m \rightarrow 2_z$, $4 \rightarrow 2_z$, $\bar{4} \rightarrow 2_z$ (strains 1 and 2 only) (above diagonal)
$4/mmm \rightarrow m_z$ (all four strains), $4/m \rightarrow m_z$, $4/m \rightarrow 2_z/m_z(P=0)$ (strains 1 and 2 only) (below diagonal)

S	1	2	3	4
1	N/A	$(1\bar{a}_+0)^N$ $(1\bar{a}_-0)^N$	$(100)^N$ $(010)^N$	$(110)^N$ $(1\bar{1}0)^N$
2	$(1\bar{a}_+0)^*$ $(1\bar{a}_-0)^*$	N/A	$(110)^N$ $(1\bar{1}0)^N$	$(100)^N$ $(010)^N$
3	$(100)^N$ $(010)^C$	$(110)^N$ $(1\bar{1}0)^C$	N/A	$(1a_+0)^N$ $(1a_-0)^N$
4	$(110)^N$ $(1\bar{1}0)^C$	$(100)^C$ $(010)^N$	$(1a_+0)^*$ $(1a_-0)^*$	N/A

$a_\pm = (p \pm \sqrt{p^2+4})/2, p = 2\varepsilon_6/(\varepsilon_2 - \varepsilon_1)$
*N eutrality or charge of DW depends on the values of strain components and P_S

Table D.14 Tetragonal to monoclinic

Species		$\bar{4}2m \rightarrow m_{xy}$
strains		polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_1 \quad P_3)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad -P_1 \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & -\varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_1 \quad P_3)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_1 \quad -P_3)$

S	1	2	3	4
1	N/A	$(010)^N$ $(10\bar{a})^C$	$(001)^N$ $(\bar{1}10)^C$	$(100)^N$ $(01a)^C$
2		N/A	$(100)^N$ $(01\bar{a})^C$	$(001)^N$ $(110)^C$
3			N/A	$(010)^N$ $(10a)^C$
4				N/A

$a = \varepsilon_5/\varepsilon_6$

Table D.15 Trigonal to monoclinic

All species		$\bar{3}m \rightarrow 2_x$ $\bar{3}m \rightarrow 2_x/m_x(P=0)$ $32 \rightarrow 2_x$(upper polarizations only)	$\bar{3}m \rightarrow m_x$ $3m \rightarrow m_x$(upper polarizations only)
strains		polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & 0 & 0 \end{pmatrix}$	$(P_1 \quad 0 \quad 0)$ $(-P_1 \quad 0 \quad 0)$	$(0 \quad P_2 \quad P_3)$ $(0 \quad -P_2 \quad -P_3)$
2	$\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ -\varepsilon_4' & -\varepsilon_5' & -\varepsilon_6' \end{pmatrix}$	$(-P_1' \quad P_1'' \quad 0)$ $(P_1' \quad -P_1'' \quad 0)$	$(-P_2' \quad -P_2'' \quad P_3)$ $(P_2' \quad P_2'' \quad -P_3)$
3	$\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ -\varepsilon_4' & \varepsilon_5' & \varepsilon_6' \end{pmatrix}$	$(-P_1' \quad -P_1'' \quad 0)$ $(P_1' \quad P_1'' \quad 0)$	$(P_2' \quad -P_2'' \quad P_3)$ $(-P_2' \quad P_2'' \quad -P_3)$

$\varepsilon_1' = (1/4)(\varepsilon_1 + 3\varepsilon_2), \varepsilon_2' = (1/4)(3\varepsilon_1 + \varepsilon_2), \varepsilon_6' = (\sqrt{3}/2)(\varepsilon_1 - \varepsilon_2), \varepsilon_5' = (\sqrt{3}/2)\varepsilon_4, \varepsilon_4' = (1/2)\varepsilon_4$
$P_1' = (1/2)P_1, P_1'' = (\sqrt{3}/2)P_1, P_2' = (\sqrt{3}/2)P_2, P_2'' = (1/2)P_2$

Table D.15 (continued)

$\bar{3}m \rightarrow 2_x$, $\bar{3}m \rightarrow 2_x/m_x(P=0)$, $32 \rightarrow 2_x$ (above diagonal)
$\bar{3}m \rightarrow m_x$, $3m \rightarrow m_x$(below diagonal)

S	1	2	3
1	N/A	$(11\bar{2}0)^N$ $(1\bar{1}0a)^C$	$(1\bar{2}10)^N$ $(10\bar{1}a)^C$
2	$(11\bar{2}0)^C$ $(1\bar{1}0a)^N$	N/A	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}a)^C$
3	$(1\bar{2}10)^C$ $(10\bar{1}a)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}a)^N$	N/A

$a = -\sqrt{3}\varepsilon_4/(\varepsilon_2 - \varepsilon_1)$

Table D.16 Hexagonal to monoclinic

All species	$6/mmm \rightarrow 2_x$ $622 \rightarrow 2_x$(upper polarizations only) $6/mmm \rightarrow 2_x/m_x(P=0)$	$6/mmm \rightarrow m_x$ $6mm \rightarrow m_x$(upper polarizations only)	$\bar{6}m2 \rightarrow m_x$
strains	polarizations	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \varepsilon_4 & 0 & 0 \end{pmatrix}$	$(P_1 \ 0 \ 0)$ $(-P_1 \ 0 \ 0)$	$(0 \ P_2 \ P_3)$ $(0 \ -P_2 \ -P_3)$	$(0 \ P_2 \ P_3)$
2 $\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ \varepsilon_4' & \varepsilon_5' & \varepsilon_6' \end{pmatrix}$	$(P_1' \ P_1'' \ 0)$ $(-P_1' \ -P_1'' \ 0)$	$(-P_2'' \ P_2' \ P_3)$ $(P_2'' \ -P_2' \ -P_3)$	$(P_2'' \ -P_2' \ -P_3)$
3 $\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ -\varepsilon_4' & \varepsilon_5' & -\varepsilon_6' \end{pmatrix}$	$(-P_1' \ P_1'' \ 0)$ $(P_1' \ -P_1'' \ 0)$	$(-P_2'' \ -P_2' \ P_3)$ $(P_2'' \ P_2' \ -P_3)$	$(-P_2'' \ -P_2' \ P_3)$
4 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ -\varepsilon_4 & 0 & 0 \end{pmatrix}$	$(-P_1 \ 0 \ 0)$ $(P_1 \ 0 \ 0)$	$(0 \ -P_2 \ P_3)$ $(0 \ P_2 \ -P_3)$	$(0 \ P_2 \ -P_3)$
5 $\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ -\varepsilon_4' & -\varepsilon_5' & \varepsilon_6' \end{pmatrix}$	$(-P_1' \ -P_1'' \ 0)$ $(P_1' \ P_1'' \ 0)$	$(P_2'' \ -P_2' \ P_3)$ $(-P_2'' \ P_2' \ -P_3)$	$(P_2'' \ -P_2' \ P_3)$
6 $\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ \varepsilon_4' & -\varepsilon_5' & -\varepsilon_6' \end{pmatrix}$	$(P_1' \ -P_1'' \ 0)$ $(-P_1' \ P_1'' \ 0)$	$(P_2'' \ P_2' \ P_3)$ $(-P_2'' \ -P_2' \ -P_3)$	$(-P_2'' \ -P_2' \ -P_3)$

$\varepsilon_1' = (1/4)(\varepsilon_1 + 3\varepsilon_2), \varepsilon_2' = (1/4)(3\varepsilon_1 + \varepsilon_2), \varepsilon_6' = (\sqrt{3}/2)(\varepsilon_1 - \varepsilon_2), \varepsilon_5' = -(\sqrt{3}/2)\varepsilon_4, \varepsilon_4' = (1/2)\varepsilon_4$
$P_1' = (1/2)P_1, P_1'' = (\sqrt{3}/2)P_1, P_2' = (1/2)P_2, P_2'' = (\sqrt{3}/2)P_2$

$6/mmm \rightarrow 2_x$, $6/mmm \rightarrow 2_x/m_x(P=0)$, $622 \rightarrow 2_x$ (above diagonal)
$6/mmm \rightarrow m_x$, $6mm \rightarrow m_x$ (below diagonal)

S	1	2	3	4	5	6
1	N/A	$(10\bar{1}0)^N$ $(1\bar{2}1\bar{a})^C$	$(11\bar{2}0)^N$ $(1\bar{1}0\bar{a})^C$	$(01\bar{1}0)^N$ $(0001)^N$	$(1\bar{2}10)^N$ $(10\bar{1}a)^C$	$(1\bar{1}00)^N$ $(11\bar{2}a)^C$
2	$(10\bar{1}0)^C$ $(1\bar{2}1\bar{a})^N$	N/A	$(01\bar{1}0)^N$ $(2\bar{1}\bar{1}\bar{a})^C$	$(1\bar{2}10)^N$ $(10\bar{1}\bar{a})^C$	$(0001)^N$ $(1\bar{1}00)^N$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}a)^C$
3	$(11\bar{2}0)^C$ $(1\bar{1}0\bar{a})^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}\bar{a})^N$	N/A	$(1\bar{1}00)^N$ $(11\bar{2}\bar{a})^C$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}\bar{a})^C$	$(0001)^N$ $(10\bar{1}0)^N$
4	$(01\bar{1}0)^C$ $(0001)^N$	$(1\bar{2}10)^C$ $(10\bar{1}\bar{a})^N$	$(1\bar{1}00)^C$ $(11\bar{2}\bar{a})^N$	N/A	$(10\bar{1}0)^N$ $(1\bar{2}1a)^C$	$(11\bar{2}0)^N$ $(1\bar{1}0a)^C$
5	$(1\bar{2}10)^C$ $(10\bar{1}a)^N$	$(0001)^N$ $(1\bar{1}00)^C$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}\bar{a})^N$	$(10\bar{1}0)^C$ $(1\bar{2}1a)^N$	N/A	$(01\bar{1}0)^N$ $(2\bar{1}\bar{1}a)^C$
6	$(1\bar{1}00)^C$ $(11\bar{2}a)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}a)^N$	$(0001)^N$ $(10\bar{1}0)^C$	$(11\bar{2}0)^C$ $(1\bar{1}0a)^N$	$(01\bar{1}0)^C$ $(2\bar{1}\bar{1}a)^N$	N/A

Table D.16 (continued)

$\bar{6}m2 \rightarrow m_x$

S	1	2	3	4	5	6
1	N/A	$(10\bar{1}0)^N$ $(1\bar{2}1\bar{a})^C$	$(11\bar{2}0)^C$ $(1\bar{1}0\bar{a})^N$	$(01\bar{1}0)^N$ $(0001)^C$	$(1\bar{2}10)^C$ $(10\bar{1}a)^N$	$(1\bar{1}00)^N$ $(11\bar{2}a)^C$
2		N/A	$(01\bar{1}0)^N$ $(2\bar{1}\bar{1}\bar{a})^C$	$(1\bar{2}10)^C$ $(10\bar{1}\bar{a})^N$	$(0001)^C$ $(1\bar{1}00)^N$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}a)^N$
3			N/A	$(1\bar{1}00)^N$ $(11\bar{2}\bar{a})^C$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}\bar{a})^N$	$(0001)^C$ $(10\bar{1}0)^N$
4				N/A	$l(10\bar{1}0)^N$ $(1\bar{2}1a)^C$	$(11\bar{2}0)^C$ $(1\bar{1}0a)^N$
5					N/A	$(01\bar{1}0)^N$ $(2\bar{1}\bar{1}a)^C$
6						N/A

$a = \varepsilon_4/(\varepsilon_2 - \varepsilon_1)$

Table D.17 Hexagonal to monoclinic

All species	$622 \to 2_z$ $6/mmm \to 2_z/m_z (P=0)$ $6 \to 2_z$ (strains 1–3 only) $6/m \to 2_z/m_z (P=0)$ (strains 1–3 only)	$6/mmm \to 2_z$ $6/m \to 2_z$(strains 1–3 only)	$6/mmm \to m_z$ $6/m \to m_z$ (strains 1–3 only) $\bar{6} \to m_z$ (strains 1–3 only, upper polarizations only)	$6mm \to 2_z$	$\bar{6}m2 \to m_z$
strains	polarizations	polarizations	polarizations	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$	$(P_1 \quad P_2 \quad 0)$ $(-P_1 \quad -P_2 \quad 0)$	$(0 \quad 0 \quad P_3)$	$(P_1 \quad P_2 \quad 0)$
2 $\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ 0 & 0 & \varepsilon_6^+ \end{pmatrix}$	$(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$	$(P_1^- \quad P_2^+ \quad 0)$ $(-P_1^- \quad -P_2^+ \quad 0)$	$(0 \quad 0 \quad P_3)$	$(-P_1^- \quad -P_2^+ \quad 0)$
3 $\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ 0 & 0 & \varepsilon_6^- \end{pmatrix}$	$(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$	$(-P_1^+ \quad P_2^- \quad 0)$ $(P_1^+ \quad -P_2^- \quad 0)$	$(0 \quad 0 \quad P_3)$	$(-P_1^+ \quad P_2^- \quad 0)$
4 $\begin{pmatrix} \varepsilon_1^- & \varepsilon_2^+ & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6^+ \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$	$(0 \quad 0 \quad -P_3)$ $(0 \quad 0 \quad P_3)$	$(P_1^- \quad -P_2^+ \quad 0)$ $(-P_1^- \quad P_2^+ \quad 0)$	$(0 \quad 0 \quad P_3)$	$(P_1^- \quad -P_2^+ \quad 0)$
5 $\begin{pmatrix} \varepsilon_1^+ & \varepsilon_2^- & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6^- \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$	$(0 \quad 0 \quad -P_3)$ $(0 \quad 0 \quad P_3)$	$(-P_1^+ \quad -P_2^- \quad 0)$ $(P_1^+ \quad P_2^- \quad 0)$	$(0 \quad 0 \quad P_3)$	$(P_1^+ \quad P_2^- \quad 0)$
6 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$	$(0 \quad 0 \quad -P_3)$ $(0 \quad 0 \quad P_3)$	$(P_1 \quad -P_2 \quad 0)$ $(-P_1 \quad P_2 \quad 0)$	$(0 \quad 0 \quad P_3)$	$(-P_1 \quad P_2 \quad 0)$

$P_1^\pm = (1/2)(P_1 \pm \sqrt{3}P_2), P_2^\pm = (1/2)(\sqrt{3}P_1 \pm P_2), \varepsilon_1^\pm = (1/4)(\varepsilon_1 \pm \sqrt{3}\varepsilon_6 + 3\varepsilon_2), \varepsilon_2^\pm = (1/4)(3\varepsilon_1 \pm \sqrt{3}\varepsilon_6 + \varepsilon_2), \varepsilon_6^\pm = (1/2)(\pm\sqrt{3}\varepsilon_1 - \varepsilon_6 \mp \sqrt{3}\varepsilon_2)$

Table D.17 (continued)

$6/mmm \to 2_z/m_z(P=0)$, $622 \to 2_z$, $6/mmm \to 2_z$, $6mm \to 2_z$ (all six strains),
$6/m \to 2_z/m_z(P=0)$, $6 \to 2_z$, $6/m \to 2_z$ (strains 1–3 only) (above diagonal)
$6/mmm \to m_z$(all six strains), $6/m \to m_z$, $\bar{6} \to m_z$ (strains 1–3 only) (below diagonal)

S	1	2	3	4	5	6
1	N/A	$(2k_+l_+0)^N$ $(2k_-l_-0)^N$	$(2m_+n_+0)^N$ $(2m_-n_-0)^N$	$(1\bar{1}00)^N$ $(11\bar{2}0)^N$	$(10\bar{1}0)^N$ $(1\bar{2}10)^N$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}0)^N$
2	$(2k_+l_+0)^*$ $(2k_-l_-0)^*$	N/A	$(2p_+q_+0)^N$ $(2p_-q_-0)^N$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}0)^N$	$(11\bar{2}0)^N$ $(1\bar{1}00)^N$	$(1\bar{2}10)^N$ $(10\bar{1}0)^N$
3	$(2m_+n_+0)^*$ $(2m_-n_-0)^*$	$(2p_+q_+0)^*$ $(2p_-q_-0)^*$	N/A	$(10\bar{1}0)^N$ $(1\bar{2}10)^N$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}0)^N$	$(11\bar{2}0)^N$ $(1\bar{1}00)^N$
4	$(1\bar{1}00)^N$ $(11\bar{2}0)^C$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}0)^C$	$(10\bar{1}0)^N$ $(1\bar{2}10)^C$	N/A	$(2q_+p_+0)^N$ $(2q_-p_-0)^N$	$(2l_+k_+0)^N$ $(2l_-k_-0)^N$
5	$(10\bar{1}0)^C$ $(1\bar{2}10)^N$	$(11\bar{2}0)^C$ $(1\bar{1}00)^N$	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}0)^C$	$(2q_+p_+0)^*$ $(2q_-p_-0)^*$	N/A	$(2n_+m_+0)^N$ $(2n_-m_-0)^N$
6	$(2\bar{1}\bar{1}0)^N$ $(01\bar{1}0)^C$	$(1\bar{2}10)^C$ $(10\bar{1}0)^N$	$(11\bar{2}0)^N$ $(1\bar{1}00)^C$	$(2l_+k_+0)^*$ $(2l_-k_-0)^*$	$(2n_+m_+0)^*$ $(2n_-m_-0)^*$	N/A

Table D.17 (continued)

$\bar{6}m2 \rightarrow m_z$

S	1	2	3	4	5	6
1	N/A	$(2k_+l_+0)^*$ $(2k_-l_-0)^*$	$(2m_+n_+0)^*$ $(2m_-n_-0)^*$	$(1\bar{1}00)^N$ $(11\bar{2}0)^C$	$(10\bar{1}0)^N$ $(1\bar{2}10)^C$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}0)^N$
2		N/A	$(2p_+q_+0)^*$ $(2p_-q_-0)^*$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}0)^N$	$(11\bar{2}0)^C$ $(1\bar{1}00)^N$	$(1\bar{2}10)^C$ $(10\bar{1}0)^N$
3			N/A	$(10\bar{1}0)^N$ $(1\bar{2}10)^C$	$(2\bar{1}\bar{1}0)^C$ $(01\bar{1}0)^N$	$(11\bar{2}0)^C$ $(1\bar{1}00)^N$
4				N/A	$(2q_+p_+0)^*$ $(2q_-p_-0)^*$	$(2l_+k_+0)^*$ $(2l_-k_-0)^*$
5					N/A	$(2n_+m_+0)^*$ $(2n_-m_-0)^*$
6						N/A

*Neutrality/charge of DW depends on the values of spontaneous strain/polarization

$k_\pm = 2[\varepsilon_6 - \sqrt{3}(\varepsilon_1 - \varepsilon_2) \mp \sqrt{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + \varepsilon_6^2}]/[\varepsilon_6 + \sqrt{3}(\varepsilon_1 - \varepsilon_2)]$,

$l_\pm = 2[-2\varepsilon_6 \pm \sqrt{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + \varepsilon_6^2}]/[\varepsilon_6 + \sqrt{3}(\varepsilon_1 - \varepsilon_2)]$

$m_\pm = 2[2\varepsilon_6 \pm \sqrt{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + \varepsilon_6^2}]/[-\varepsilon_6 + \sqrt{3}(\varepsilon_1 - \varepsilon_2)]$,

$n_\pm = 2[-\varepsilon_6 - \sqrt{3}(\varepsilon_1 - \varepsilon_2) \mp \sqrt{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + \varepsilon_6^2}]/[-\varepsilon_6 + \sqrt{3}(\varepsilon_1 - \varepsilon_2)]$

$p_\pm = 2[-\varepsilon_6 - \sqrt{3}(\varepsilon_1 - \varepsilon_2) \mp \sqrt{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + \varepsilon_6^2}]/\varepsilon_6$,

$q_\pm = 2[-\varepsilon_6 + \sqrt{3}(\varepsilon_1 - \varepsilon_2) \pm \sqrt{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + \varepsilon_6^2}]/\varepsilon_6$

Table D.18 Hexagonal to monoclinic

Species		$\bar{6}m2 \to 2_y$
strains		polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & \varepsilon_5 & 0 \end{pmatrix}$	$(0 \quad P_2 \quad 0)$
2	$\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ \varepsilon_4' & \varepsilon_5' & \varepsilon_6' \end{pmatrix}$	$(P_2'' \quad -P_2' \quad 0)$
3	$\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ \varepsilon_4' & -\varepsilon_5' & -\varepsilon_6' \end{pmatrix}$	$(-P_2'' \quad -P_2' \quad 0)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & -\varepsilon_5 & 0 \end{pmatrix}$	$(0 \quad P_2 \quad 0)$
5	$\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ -\varepsilon_4' & -\varepsilon_5' & \varepsilon_6' \end{pmatrix}$	$(P_2'' \quad -P_2' \quad 0)$
6	$\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ -\varepsilon_4' & \varepsilon_5' & -\varepsilon_6' \end{pmatrix}$	$(-P_2'' \quad -P_2' \quad 0)$

$\varepsilon_1' = (1/4)(\varepsilon_1 + 3\varepsilon_2), \varepsilon_2' = (1/4)(3\varepsilon_1 + \varepsilon_2), \varepsilon_6' = (\sqrt{3}/2)(\varepsilon_1 - \varepsilon_2),$
$\varepsilon_5' = (1/2)\varepsilon_5, \varepsilon_4' = (\sqrt{3}/2)\varepsilon_5$
$P_2' = (1/2)P_2, P_2'' = (\sqrt{3}/2)P_2$

S	1	2	3	4	5	6
1	N/A	$(10\bar{1}\bar{a})^N$ $(1\bar{2}10)^C$	$(11\bar{2}\bar{b})^C$ $(1\bar{1}00)^N$	$(2\bar{1}\bar{1}0)^N$ $(0001)^N$	$(1\bar{2}1\bar{b})^C$ $(10\bar{1}0)^N$	$(1\bar{1}0\bar{a})^N$ $(11\bar{2}0)^C$
2		N/A	$(01\bar{1}\bar{a})^N$ $(2\bar{1}\bar{1}0)^C$	$(1\bar{2}1b)^C$ $(10\bar{1}0)^N$	$(0001)^N$ $(11\bar{2}0)^N$	$(2\bar{1}\bar{1}\bar{b})^C$ $(01\bar{1}0)^N$
3			N/A	$(1\bar{1}0a)^N$ $(11\bar{2}0)^C$	$(2\bar{1}\bar{1}b)^C$ $(01\bar{1}0)^N$	$(0001)^N$ $(1\bar{2}10)^N$
4				N/A	$(10\bar{1}a)^N$ $(1\bar{2}10)^C$	$(11\bar{2}b)^C$ $(1\bar{1}00)^N$
5					N/A	$(01\bar{1}a)^N$ $(2\bar{1}\bar{1}0)^C$
6						N/A

$a = \varepsilon_5/(\varepsilon_2 - \varepsilon_1), b = 3a$

Table D.19 Cubic to monoclinic

All species		$m\bar{3}m \rightarrow m_{xy}$ $\bar{4}3m \rightarrow m_{xy}$ (upper polarizations only)	$m\bar{3}m \rightarrow 2_{xy}$ $m\bar{3}m \rightarrow 2_{xy}/m_{xy}(P=0)$ $432 \rightarrow 2_{xy}$ (upper polarizations only)
strains		polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & \varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_1 \quad P_3)$ $(-P_1 \quad P_1 \quad -P_3)$	$(P_1 \quad P_1 \quad 0)$ $(-P_1 \quad -P_1 \quad 0)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & \varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad -P_1 \quad -P_3)$ $(P_1 \quad P_1 \quad P_3)$	$(-P_1 \quad P_1 \quad 0)$ $(P_1 \quad -P_1 \quad 0)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_5 & -\varepsilon_5 & \varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_1 \quad P_3)$ $(P_1 \quad -P_1 \quad -P_3)$	$(-P_1 \quad -P_1 \quad 0)$ $(P_1 \quad P_1 \quad 0)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_5 & -\varepsilon_5 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_1 \quad -P_3)$ $(-P_1 \quad -P_1 \quad P_3)$	$(P_1 \quad -P_1 \quad 0)$ $(-P_1 \quad P_1 \quad 0)$
5	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ \varepsilon_5 & \varepsilon_6 & -\varepsilon_5 \end{pmatrix}$	$(-P_1 \quad P_3 \quad P_1)$ $(P_1 \quad -P_3 \quad -P_1)$	$(P_1 \quad 0 \quad P_1)$ $(-P_1 \quad 0 \quad -P_1)$
6	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ \varepsilon_5 & -\varepsilon_6 & \varepsilon_5 \end{pmatrix}$	$(-P_1 \quad -P_3 \quad -P_1)$ $(P_1 \quad P_3 \quad P_1)$	$(P_1 \quad 0 \quad -P_1)$ $(-P_1 \quad 0 \quad P_1)$
7	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ \varepsilon_6 & -\varepsilon_5 & \varepsilon_5 \end{pmatrix}$	$(P_3 \quad P_1 \quad -P_1)$ $(-P_3 \quad -P_1 \quad P_1)$	$(0 \quad P_1 \quad P_1)$ $(0 \quad -P_1 \quad -P_1)$
8	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ -\varepsilon_6 & -\varepsilon_5 & -\varepsilon_5 \end{pmatrix}$	$(-P_3 \quad P_1 \quad P_1)$ $(P_3 \quad -P_1 \quad -P_1)$	$(0 \quad P_1 \quad -P_1)$ $(0 \quad -P_1 \quad P_1)$
9	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ -\varepsilon_5 & -\varepsilon_6 & -\varepsilon_5 \end{pmatrix}$	$(P_1 \quad -P_3 \quad P_1)$ $(-P_1 \quad P_3 \quad -P_1)$	$(-P_1 \quad 0 \quad P_1)$ $(P_1 \quad 0 \quad -P_1)$
10	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ -\varepsilon_5 & \varepsilon_6 & \varepsilon_5 \end{pmatrix}$	$(P_1 \quad P_3 \quad -P_1)$ $(-P_1 \quad -P_3 \quad P_1)$	$(-P_1 \quad 0 \quad -P_1)$ $(P_1 \quad 0 \quad P_1)$
11	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ -\varepsilon_6 & \varepsilon_5 & \varepsilon_5 \end{pmatrix}$	$(-P_3 \quad -P_1 \quad -P_1)$ $(P_3 \quad P_1 \quad P_1)$	$(0 \quad -P_1 \quad P_1)$ $(0 \quad P_1 \quad -P_1)$
12	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ \varepsilon_6 & \varepsilon_5 & -\varepsilon_5 \end{pmatrix}$	$(P_3 \quad -P_1 \quad P_1)$ $(-P_3 \quad P_1 \quad -P_1)$	$(0 \quad -P_1 \quad -P_1)$ $(0 \quad P_1 \quad P_1)$

Table D.19 (continued)
$m\bar{3}m \rightarrow m_{xy}$, $\bar{4}3m \rightarrow m_{xy}$ (above diagonal)
$m\bar{3}m \rightarrow 2_{xy}$, $m\bar{3}m \rightarrow 2_{xy}/m_{xy}(P=0)$, $432 \rightarrow 2_{xy}$ (below diagonal)

S	1	2	3	4	5	6	7	8	9	10	11	12
1	N/A	$(010)^N$ $(10\bar{a})^C$	$(001)^N$ $(1\bar{1}0)^C$	$(100)^N$ $(01a)^C$	R	R	R	R	$(011)^C$ $(\bar{c}1\bar{1})^N$	$(01\bar{1})^C$ $(\bar{b}11)^N$	$(101)^C$ $(1\bar{b}\bar{1})^N$	$(10\bar{1})^C$ $(1\bar{c}1)^N$
2	$(010)^N$ $(10\bar{a})^C$	N/A	$(100)^N$ $(01\bar{a})^C$	$(001)^N$ $(110)^C$	$(011)^C$ $(b1\bar{1})^N$	$(01\bar{1})^C$ $(c11)^N$	R	R	R	R	$(10\bar{1})^C$ $(1c1)^N$	$(101)^C$ $(1b\bar{1})^N$
3	$(001)^N$ $(1\bar{1}0)^N$	$(100)^N$ $(01\bar{a})^C$	N/A	$(010)^N$ $(10a)^C$	$(01\bar{1})^C$ $(\bar{c}11)^N$	$(011)^C$ $(\bar{b}1\bar{1})^N$	$(10\bar{1})^C$ $(1\bar{b}1)^N$	$(101)^C$ $(1\bar{c}\bar{1})^N$	R	R	R	R
4	$(100)^N$ $(01a)^C$	$(001)^N$ $(110)^N$	$(010)^N$ $(10a)^C$	N/A	R	R	$(101)^C$ $(1c\bar{1})^N$	$(10\bar{1})^C$ $(1b1)^N$	$(01\bar{1})^C$ $(b11)^N$	$(011)^C$ $(c1\bar{1})^N$	R	R
5	R	$(011)^N$ $(b1\bar{1})^C$	$(01\bar{1})^N$ $(\bar{c}11)^C$	R	N/A	$(100)^N$ $(0\bar{a}1)^C$	R	$(110)^C$ $(1\bar{1}\bar{c})^N$	$(001)^N$ $(1a0)^C$	$(010)^N$ $(10\bar{1})^C$	R	$(1\bar{1}0)^C$ $(11\bar{b})^N$
6	R	$(01\bar{1})^N$ $(c11)^C$	$(011)^N$ $(\bar{b}1\bar{1})^C$	R	$(100)^N$ $(0\bar{a}1)^C$	N/A	$(110)^C$ $(1\bar{1}b)^N$	R	$(010)^N$ $(101)^C$	$(001)^N$ $(1\bar{a}0)^C$	$(1\bar{1}0)^C$ $(11c)^N$	R
7	R	R	$(10\bar{1})^N$ $(1\bar{b}1)^C$	$(101)^N$ $(1c\bar{1})^C$	R	$(110)^N$ $(1\bar{1}b)^C$	N/A	$(010)^N$ $(a01)^C$	R	$(1\bar{1}0)^C$ $(11\bar{c})^N$	$(001)^N$ $(\bar{a}10)^C$	$(100)^N$ $(0\bar{1}1)^C$
8	R	R	$(101)^N$ $(1\bar{c}\bar{1})^C$	$(10\bar{1})^N$ $(1b1)^C$	$(110)^N$ $(1\bar{1}\bar{c})^C$	R	$(010)^N$ $(a01)^C$	N/A	$(1\bar{1}0)^C$ $(11b)^N$	R	$(100)^N$ $(011)^C$	$(001)^N$ $(a10)^C$
9	$(011)^N$ $(\bar{c}1\bar{1})^C$	R	R	$(01\bar{1})^N$ $(b11)^C$	$(001)^N$ $(1a0)^C$	$(010)^N$ $(101)^N$	R	$(1\bar{1}0)^N$ $(11b)^C$	N/A	$(100)^N$ $(0a1)^C$	R	$(110)^C$ $(1\bar{1}c)^N$
10	$(01\bar{1})^N$ $(\bar{b}11)^C$	R	R	$(011)^N$ $(c1\bar{1})^C$	$(010)^N$ $(10\bar{1})^N$	$(001)^N$ $(1\bar{a}0)^C$	$(1\bar{1}0)^N$ $(11\bar{c})^C$	R	$(100)^N$ $(0a1)^C$	N/A	$(110)^C$ $(1\bar{1}\bar{b})^N$	R
11	$(101)^N$ $(1\bar{b}\bar{1})^C$	$(10\bar{1})^N$ $(1c1)^C$	R	R	R	$(1\bar{1}0)^N$ $(11c)^C$	$(001)^N$ $(\bar{a}10)^C$	$(100)^N$ $(011)^N$	R	$(110)^N$ $(1\bar{1}\bar{b})^C$	N/A	$(010)^N$ $(\bar{a}01)^C$
12	$(10\bar{1})^N$ $(1\bar{c}1)^C$	$(101)^N$ $(1b\bar{1})^C$	R	R	$(1\bar{1}0)^N$ $(11\bar{b})^C$	R	$(100)^N$ $(0\bar{1}1)^N$	$(001)^N$ $(a10)^C$	$(110)^N$ $(1\bar{1}c)^C$	R	$(010)^N$ $(\bar{a}01)^C$	N/A

$a = \varepsilon_5/\varepsilon_6, b = (\varepsilon_6 - \varepsilon_5)/(\varepsilon_3 - \varepsilon_1), c = (\varepsilon_6 + \varepsilon_5)/(\varepsilon_3 - \varepsilon_1)$

Table D.20 Cubic to monoclinic species

All species		$m\bar{3}m \to 2_z$ $m\bar{3}m \to 2_z/m_z (P=0)$ $432 \to 2_z$(upper polarizations only) strains 1–6 only for following species: $m\bar{3} \to 2_z$ $m\bar{3} \to 2_z/m_z (P=0)$ $23 \to 2_z$ (upper polarizations only)	$\bar{4}3m \to 2_z$	$m\bar{3}m \to m_z$ $m\bar{3} \to m_z$ (strains 1–6 only)
strains		polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$	$(0 \quad 0 \quad P_3)$	$(P_1 \quad P_2 \quad 0)$ $(-P_1 \quad -P_2 \quad 0)$
2	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ \varepsilon_6 & 0 & 0 \end{pmatrix}$	$(P_3 \quad 0 \quad 0)$ $(-P_3 \quad 0 \quad 0)$	$(P_3 \quad 0 \quad 0)$	$(0 \quad P_1 \quad P_2)$ $(0 \quad -P_1 \quad -P_2)$
3	$\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ 0 & \varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad P_3 \quad 0)$ $(0 \quad -P_3 \quad 0)$	$(0 \quad P_3 \quad 0)$	$(P_2 \quad 0 \quad P_1)$ $(-P_2 \quad 0 \quad -P_1)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$ $(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad -P_3)$	$(P_1 \quad -P_2 \quad 0)$ $(-P_1 \quad P_2 \quad 0)$
5	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ -\varepsilon_6 & 0 & 0 \end{pmatrix}$	$(-P_3 \quad 0 \quad 0)$ $(P_3 \quad 0 \quad 0)$	$(-P_3 \quad 0 \quad 0)$	$(0 \quad P_1 \quad -P_2)$ $(0 \quad -P_1 \quad P_2)$
6	$\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ 0 & -\varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad -P_3 \quad 0)$ $(0 \quad P_3 \quad 0)$	$(0 \quad -P_3 \quad 0)$	$(P_2 \quad 0 \quad -P_1)$ $(-P_2 \quad 0 \quad P_1)$
7	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ -\varepsilon_6 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$	$(0 \quad 0 \quad -P_3)$	$(-P_2 \quad P_1 \quad 0)$ $(P_2 \quad -P_1 \quad 0)$
8	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ \varepsilon_6 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$ $(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad P_3)$	$(P_2 \quad P_1 \quad 0)$ $(-P_2 \quad -P_1 \quad 0)$
9	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_2 \\ 0 & \varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad -P_3 \quad 0)$ $(0 \quad P_3 \quad 0)$	$(0 \quad P_3 \quad 0)$	$(P_1 \quad 0 \quad P_2)$ $(-P_1 \quad 0 \quad -P_2)$
10	$\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ \varepsilon_6 & 0 & 0 \end{pmatrix}$	$(-P_3 \quad 0 \quad 0)$ $(P_3 \quad 0 \quad 0)$	$(P_3 \quad 0 \quad 0)$	$(0 \quad P_2 \quad P_1)$ $(0 \quad -P_2 \quad -P_1)$
11	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_2 \\ 0 & -\varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad P_3 \quad 0)$ $(0 \quad -P_3 \quad 0)$	$(0 \quad -P_3 \quad 0)$	$(P_1 \quad 0 \quad -P_2)$ $(-P_1 \quad 0 \quad P_2)$
12	$\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ -\varepsilon_6 & 0 & 0 \end{pmatrix}$	$(P_3 \quad 0 \quad 0)$ $(-P_3 \quad 0 \quad 0)$	$(-P_3 \quad 0 \quad 0)$	$(0 \quad P_2 \quad -P_1)$ $(0 \quad -P_2 \quad P_1)$

Table D.20 (continued)

$\bar{4}3m \rightarrow 2_z$(above diagonal)

$m\bar{3}m \rightarrow 2_z$, $m\bar{3}m \rightarrow 2_z/m_z(P=0)$, $432 \rightarrow 2_z$(all 12 strains), $m\bar{3} \rightarrow 2_z$, $m\bar{3} \rightarrow 2_z/m_z(P=0)$, $23 \rightarrow 2_z$(strains 1–6 only) (below diagonal)

S	1	2	3	4	5	6	7	8	9	10	11	12
1	N/A	R	R	$(100)^N$ $(010)^N$	R	R	$(1\bar{z}_+0)^N$ $(1\bar{z}_-0)^N$	$(1\bar{1}0)^N$ $(110)^N$	$(01\bar{1})^C$ $(\bar{c}11)^N$	$(10\bar{1})^C$ $(1\bar{d}1)^N$	$(011)^C$ $(\bar{c}1\bar{1})^N$	$(101)^C$ $(1\bar{d}\bar{1})^N$
2	R	N/A	R	R	$(010)^N$ $(001)^N$	R	$(101)^C$ $(1c\bar{1})^N$	$(10\bar{1})^C$ $(1\bar{c}1)^N$	$(1\bar{1}0)^C$ $(11\bar{d})^N$	$(011)^N$ $(01\bar{1})^N$	$(110)^C$ $(1\bar{1}d)^N$	$(01\bar{z}_+)^N$ $(01\bar{z}_-)^N$
3	R	R	N/A	R	R	$(100)^N$ $(001)^N$	$(011)^C$ $(d1\bar{1})^N$	$(01\bar{1})^C$ $(\bar{d}11)^N$	$(10\bar{1})^N$ $(101)^N$	$(1\bar{1}0)^C$ $(11\bar{c})^N$	$(10z_+)^N$ $(10z_-)^N$	$(110)^C$ $(1\bar{1}\bar{c})^N$
4	$(100)^N$ $(010)^N$	R	R	N/A	R	R	$(1\bar{1}0)^N$ $(110)^N$	$(1z_+0)^N$ $(1z_-0)^N$	$(011)^C$ $(c1\bar{1})^N$	$(101)^C$ $(1\bar{d}\bar{1})^N$	$(01\bar{1})^C$ $(c11)^N$	$(10\bar{1})^C$ $(1d1)^N$
5	R	$(010)^N$ $(001)^N$	R	R	N/A	R	$(10\bar{1})^C$ $(1c1)^N$	$(101)^C$ $(1\bar{c}\bar{1})^N$	$(110)^C$ $(1\bar{1}\bar{d})^N$	$(01z_+)^N$ $(01z_-)^N$	$(1\bar{1}0)^C$ $(11d)^N$	$(01\bar{1})^N$ $(011)^N$
6	R	R	$(100)^N$ $(001)^N$	R	R	N/A	$(01\bar{1})^C$ $(d11)^N$	$(011)^C$ $(\bar{d}1\bar{1})^N$	$(10\bar{z}_+)^N$ $(10\bar{z}_-)^N$	$(110)^C$ $(1\bar{1}c)^N$	$(10\bar{1})^N$ $(101)^N$	$(1\bar{1}0)^C$ $(11c)^N$
7	$(1\bar{z}_+0)^N$ $(1\bar{z}_-0)^N$	$(101)^N$ $(1c\bar{1})^C$	$(011)^N$ $(d1\bar{1})^C$	$(1\bar{1}0)^N$ $(110)^N$	$(10\bar{1})^N$ $(1c1)^C$	$(01\bar{1})^N$ $(d11)^C$	N/A	$(100)^N$ $(010)^N$	R	R	R	R
8	$(1\bar{1}0)^N$ $(110)^N$	$(10\bar{1})^N$ $(1\bar{c}1)^C$	$(01\bar{1})^N$ $(\bar{d}11)^C$	$(1z_+0)^N$ $(1z_-0)^N$	$(101)^N$ $(1\bar{c}\bar{1})^C$	$(011)^N$ $(\bar{d}1\bar{1})^C$	$(100)^N$ $(010)^N$	N/A	R	R	R	R
9	$(01\bar{1})^N$ $(\bar{c}11)^C$	$(1\bar{1}0)^N$ $(11\bar{d})^C$	$(10\bar{1})^N$ $(101)^N$	$(011)^N$ $(c1\bar{1})^C$	$(110)^N$ $(1\bar{1}\bar{d})^C$	$(10\bar{z}_+)^N$ $(10\bar{z}_-)^N$	R	R	N/A	R	$(100)^N$ $(001)^N$	R
10	$(10\bar{1})^N$ $(1\bar{d}1)^C$	$(011)^N$ $(01\bar{1})^N$	$(1\bar{1}0)^N$ $(11\bar{c})^C$	$(101)^N$ $(1\bar{d}\bar{1})^C$	$(01z_+)^N$ $(01z_-)^N$	$(110)^N$ $(1\bar{1}c)^C$	R	R	R	N/A	R	$(010)^N$ $(001)^N$
11	$(011)^N$ $(\bar{c}1\bar{1})^C$	$(110)^N$ $(1\bar{1}d)^C$	$(10z_+)^N$ $(10z_-)^N$	$(01\bar{1})^N$ $(c11)^C$	$(1\bar{1}0)^N$ $(11d)^C$	$(10\bar{1})^N$ $(101)^N$	R	R	$(100)^N$ $(001)^N$	R	N/A	R
12	$(101)^N$ $(1\bar{d}\bar{1})^C$	$(01\bar{z}_+)^N$ $(01\bar{z}_-)^N$	$(110)^N$ $(1\bar{1}\bar{c})^C$	$(10\bar{1})^N$ $(1d1)^C$	$(01\bar{1})^N$ $(011)^N$	$(1\bar{1}0)^N$ $(11c)^C$	R	R	R	$(010)^N$ $(001)^N$	R	N/A

Table D.20 (continued)

$m\bar{3}m \to m_z$(all 12 strains), $m\bar{3} \to m_z$(strains 1–6 only)

S	1	2	3	4	5	6	7	8	9	10	11	12
1	N/A	R	R	$(100)^N$ $(010)^C$	R	R	$(1\bar{z}_+0)^*$ $(1\bar{z}_-0)^*$	$(1\bar{1}0)^C$ $(110)^N$	$(01\bar{1})^C$ $(\bar{c}11)^N$	$(10\bar{1})^C$ $(1\bar{d}1)^N$	$(011)^C$ $(\bar{c}1\bar{1})^N$	$(101)^C$ $(1\bar{d}\bar{1})^N$
2		N/A	R	R	$(010)^N$ $(001)^C$	R	$(101)^C$ $(1c\bar{1})^N$	$(10\bar{1})^C$ $(1\bar{c}1)^N$	$(1\bar{1}0)^C$ $(11\bar{d})^N$	$(011)^N$ $(01\bar{1})^C$	$(110)^N$ $(1\bar{1}d)^C$	$(01\bar{z}_+)^*$ $(01\bar{z}_-)^*$
3			N/A	R	R	$(100)^N$ $(001)^C$	$(011)^N$ $(d1\bar{1})^C$	$(01\bar{1})^C$ $(\bar{d}11)^N$	$(10\bar{1})$ (101)	$(1\bar{1}0)^C$ $(11\bar{c})^N$	$(10z_+)^*$ $(10z_-)^*$	(110) $(1\bar{1}\bar{c})$
4				N/A	R	R	$(1\bar{1}0)^C$ $(110)^N$	$(1z_+0)^*$ $(1z_-0)^*$	(011) $(c1\bar{1})$	$(101)^N$ $(1d\bar{1})^C$	$(01\bar{1})^C$ $(c11)^N$	$(10\bar{1})^N$ $(1d1)^C$
5					N/A	R	$(10\bar{1})^C$ $(1c1)^N$	$(101)^C$ $(1\bar{c}\bar{1})^N$	$(110)^N$ $(1\bar{1}\bar{d})^C$	$(01z_+)^*$ $(01z_-)^*$	$(1\bar{1}0)^C$ $(11d)^N$	$(01\bar{1})$ (011)
6						N/A	$(01\bar{1})^N$ $(d11)^C$	$(011)^C$ $(\bar{d}1\bar{1})^N$	$(10\bar{z}_+)^*$ $(10\bar{z}_-)^*$	(110) $(1\bar{1}c)$	$(10\bar{1})^N$ $(101)^C$	$(1\bar{1}0)^C$ $(11c)^N$
7							N/A	$(100)^C$ $(010)^N$	R	R	R	R
8								N/A	R	R	R	R
9									N/A	R	$(100)^N$ $(001)^C$	R
10										N/A	R	$(010)^N$ $(001)^C$
11											N/A	R
12												N/A

$a = \varepsilon_2 - \varepsilon_1, b = -2\varepsilon_6, c = \varepsilon_6/(\varepsilon_3 - \varepsilon_2), d = \varepsilon_6/(\varepsilon_3 - \varepsilon_1), z_\pm = (-b \pm \sqrt{b^2 + 4a^2})/2a$

*Neutrality/charge of DW depends on the values of spontaneous strain/polarization

Table D.21 Orthorhombic to orthorhombic

Species		$mmm \rightarrow m_x m_y 2_z$
strains		polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$

Table D.22 Tetragonal to orthorhombic

Species		$4mm \rightarrow m_x m_y 2_z$ $422 \rightarrow 2_x 2_y 2_z (P=0)$	$4/mmm \rightarrow m_x m_y 2_z$ $4/mmm \rightarrow 2_x 2_y 2_z (P=0)$ $\bar{4}2m \rightarrow 2_x 2_y 2_z (P=0)$	$4/mmm \rightarrow 2_x m_y m_z$ $4/mmm \rightarrow m_x m_y m_z$ $(P=0)$
strains		polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$	$(P_1 \quad 0 \quad 0)$ $(-P_1 \quad 0 \quad 0)$
2	$\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$	$(0 \quad 0 \quad -P_3)$ $(0 \quad 0 \quad P_3)$	$(0 \quad -P_1 \quad 0)$ $(0 \quad P_1 \quad 0)$

$4mm \rightarrow m_x m_y 2_z$, $422 \rightarrow 2_x 2_y 2_z (P=0)$; $4/mmm \rightarrow m_x m_y 2_z$, $4/mmm \rightarrow 2_x 2_y 2_z (P=0)$,
$\bar{4}2m \rightarrow 2_x 2_y 2_z (P=0)$(above diagonal)
$4/mmm \rightarrow m_x m_y m_z (P=0)$, $4/mmm \rightarrow 2_x m_y m_z$(below diagonal)

S	1	2
1	N/A	$(110)^{N}$ $(1\bar{1}0)^{N}$
2	$(110)^{C}$ $(1\bar{1}0)^{N}$	N/A

Table D.23 Tetragonal to orthorhombic

Species		$\bar{4}2m \rightarrow m_{xy} m_{\bar{x}y} 2_z$
strains		polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$

S	1	2
1	N/A	$(100)^{N}$ $(010)^{N}$
2		N/A

Table D.24 Hexagonal to orthorhombic

All species	$\bar{6}m2 \rightarrow m_x 2_y m_z$ $622 \rightarrow 2_x 2_y 2_z (P=0)$ $6/mmm \rightarrow m_x m_y m_z\ (P=0)$ $6/mmm \rightarrow 2_x 2_y 2_z (P=0)$	$6/mmm \rightarrow 2_x m_y m_z$	$6/mmm \rightarrow m_x m_y 2_z$ $6\,mm \rightarrow m_x m_y 2_z$ (upper polarizations only)
strains	polarizations	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad P_2 \quad 0)$	$(P_1 \quad 0 \quad 0)$ $(-P_1 \quad 0 \quad 0)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$
2 $\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ 0 & 0 & \varepsilon_6' \end{pmatrix}$	$(-P_2'' \quad P_2' \quad 0)$	$(P_1' \quad P_1'' \quad 0)$ $(-P_1' \quad -P_1'' \quad 0)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$
3 $\begin{pmatrix} \varepsilon_1' & \varepsilon_2' & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6' \end{pmatrix}$	$(-P_2'' \quad -P_2' \quad P_3)$	$(-P_1' \quad P_1'' \quad 0)$ $(P_1' \quad -P_1'' \quad 0)$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$

$\varepsilon_1' = (1/4)(\varepsilon_1 + 3\varepsilon_2), \varepsilon_2' = (1/4)(3\varepsilon_1 + \varepsilon_2), \varepsilon_6' = (\sqrt{3}/2)(\varepsilon_1 - \varepsilon_2)$
$P_1' = (1/2)P_1, P_1'' = (\sqrt{3}/2)P_1, P_2' = (1/2)P_2, P_2'' = (\sqrt{3}/2)P_2$

$6/mmm \rightarrow m_x m_y m_z (P=0)$, $6/mmm \rightarrow 2_x 2_y 2_z (P=0)$, $\bar{6}m2 \rightarrow m_x 2_y m_z$, $622 \rightarrow 222 (P=0)$ (above diagonal); $6/mmm \rightarrow 2_x m_y m_z$ (below diagonal)

S	1	2	3
1	N/A	$(10\bar{1}0)^{C}$ $(1\bar{2}10)^{N}$	$(11\bar{2}0)^{C}$ $(1\bar{1}00)^{N}$
2	$(10\bar{1}0)^{N}$ $(1\bar{2}10)^{C}$	N/A	$(01\bar{1}0)^{C}$ $(2\bar{1}\bar{1}0)^{N}$
3	$(11\bar{2}0)^{N}$ $(1\bar{1}00)^{C}$	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}0)^{C}$	N/A

$6/mmm \rightarrow m_x m_y 2_z$, $6\,mm \rightarrow m_x m_y 2_z$

S	1	2	3
1	N/A	$(10\bar{1}0)^{N}$ $(1\bar{2}10)^{N}$	$(11\bar{2}0)^{N}$ $(1\bar{1}00)^{N}$
2		N/A	$(01\bar{1}0)^{N}$ $(2\bar{1}\bar{1}0)^{N}$
3			N/A

Table D.25 Cubic to orthorhombic

All species	$m\bar{3}m \to m_x m_y 2_z$, $m\bar{3}m \to 2_x 2_y 2_z (P=0)$ $m\bar{3}m \to m_x m_y m_z (P=0)$, $432 \to 2_x 2_y 2_z (P=0)$ $\bar{4}3m \to 222(P=0)$ Strains 1–3 only for following species: $23 \to 222(P=0)$, $m\bar{3} \to mmm(P=0)$ $m\bar{3} \to 222(P=0)$, $m\bar{3} \to m_x m_y 2_z$
strains	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$
2 $\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_2 \\ 0 & 0 & 0 \end{pmatrix}$	$(P_3 \quad 0 \quad 0)$ $(-P_3 \quad 0 \quad 0)$
3 $\begin{pmatrix} \varepsilon_2 & \varepsilon_3 & \varepsilon_1 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad P_3 \quad 0)$ $(0 \quad -P_3 \quad 0)$
4 $\begin{pmatrix} \varepsilon_2 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$
5 $\begin{pmatrix} \varepsilon_3 & \varepsilon_2 & \varepsilon_1 \\ 0 & 0 & 0 \end{pmatrix}$	$(-P_3 \quad 0 \quad 0)$ $(P_3 \quad 0 \quad 0)$
6 $\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_2 \\ 0 & 0 & 0 \end{pmatrix}$	$(0 \quad -P_3 \quad 0)$ $(0 \quad P_3 \quad 0)$

$m\bar{3}m \to m_x m_y m_z (P=0)$, $m\bar{3}m \to m_x m_y 2_z$, $m\bar{3}m \to 2_x 2_y 2_z (P=0)$, $432 \to 222(P=0)$, $\bar{4}3m \to 222(P=0)$ (all six strains), $m\bar{3} \to m_x m_y 2_z$, $23 \to 222(P=0)$, $m\bar{3} \to mmm(P=0)$, $m\bar{3} \to 222(P=0)$ (strains 1–3 only)

S	1	2	3	4	5	6
1	N/A	R	R	$(1\bar{1}0)^N$ $(110)^N$	$(10\bar{1})^N$ $(101)^C$	$(01\bar{1})^N$ $(011)^C$
2		N/A	R	$(10\bar{1})^C$ $(101)^N$	$(01\bar{1})^N$ $(011)^N$	$(1\bar{1}0)^N$ $(110)^C$
3			N/A	$(01\bar{1})^C$ $(011)^N$	$(1\bar{1}0)^N$ $(110)^C$	$(10\bar{1})^N$ $(101)^N$
4				N/A	R	R
5					N/A	R
6						N/A

Table D.26 Cubic to orthorhombic

All species	$m\bar{3}m \to m_{xy} m_{\bar{x}y} m_z (P=0)$ $m\bar{3}m \to m_{xy} m_{\bar{x}y} 2_z$ $m\bar{3}m \to 2_{xy} 2_{\bar{x}y} 2_z (P=0)$ upper symmetry operations only for $432 \to 2_{xy} 2_{\bar{x}y} 2_z (P=0)$
strains	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$
2 $\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(P_3 \quad 0 \quad 0)$ $(-P_3 \quad 0 \quad 0)$

Table D.26 (continued)

All species	$m\bar{3}m \to m_{xy}m_{\bar{x}y}m_z(P=0)$ $m\bar{3}m \to m_{xy}m_{\bar{x}y}2_z$ $m\bar{3}m \to 2_{xy}2_{\bar{x}y}2_z(P=0)$ upper symmetry operations only for $432 \to 2_{xy}2_{\bar{x}y}2_z(P=0)$
strains	polarizations
3 $\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ 0 & \varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad P_3 \quad 0)$ $(0 \quad -P_3 \quad 0)$
4 $\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ -\varepsilon_6 & 0 & 0 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$ $(0 \quad 0 \quad -P_3)$
5 $\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ \varepsilon_6 & 0 & 0 \end{pmatrix}$	$(-P_3 \quad 0 \quad 0)$ $(P_3 \quad 0 \quad 0)$
6 $\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ 0 & -\varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad -P_3 \quad 0)$ $(0 \quad P_3 \quad 0)$

S	1	2	3	4	5	6
1	N/A	$(100)^N$ $(010)^N$	$(01\bar{1})^N$ $(\bar{a}11)^C$	$(101)^N$ $(1\bar{a}\bar{1})^C$	$(10\bar{1})^C$ $(1\bar{a}1)^N$	$(011)^N$ $(\bar{a}1\bar{1})^C$
2		N/A	$(011)^C$ $(a1\bar{1})^N$	$(10\bar{1})^C$ $(1a1)^N$	$(101)^N$ $(1a\bar{1})^C$	$(01\bar{1})^C$ $(a11)^N$
3			N/A	$(110)^C$ $(1\bar{1}\bar{a})^N$	$(1\bar{1}0)^N$ $(11\bar{a})^C$	$(100)^N$ $(001)^N$
4				N/A	$(010)^N$ $(001)^N$	$(1\bar{1}0)^C$ $(11a)^N$
5					N/A	$(110)^N$ $(\bar{1}1\bar{a})^C$
6						N/A

$a = \dfrac{\varepsilon_6}{\varepsilon_3 - \varepsilon_1}$

Table D.27 Cubic to orthorhombic

All species		$\bar{4}3m \to m_{xy}m_{\bar{x}y}2_z$	$m\bar{3}m \to 2_{xy}m_{\bar{x}y}m_z$
strains		polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & \varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad P_3)$	$(P_1 \quad P_1 \quad 0)$ $(-P_1 \quad -P_1 \quad 0)$
2	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ \varepsilon_6 & 0 & 0 \end{pmatrix}$	$(P_3 \quad 0 \quad 0)$	$(0 \quad P_1 \quad P_1)$ $(0 \quad -P_1 \quad -P_1)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ 0 & \varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad P_3 \quad 0)$	$(P_1 \quad 0 \quad P_1)$ $(-P_1 \quad 0 \quad -P_1)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & -\varepsilon_6 \end{pmatrix}$	$(0 \quad 0 \quad -P_3)$	$(-P_1 \quad P_1 \quad 0)$ $(P_1 \quad -P_1 \quad 0)$
5	$\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ -\varepsilon_6 & 0 & 0 \end{pmatrix}$	$(-P_3 \quad 0 \quad 0)$	$(0 \quad P_1 \quad -P_1)$ $(0 \quad -P_1 \quad P_1)$
6	$\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ 0 & -\varepsilon_6 & 0 \end{pmatrix}$	$(0 \quad -P_3 \quad 0)$	$(P_1 \quad 0 \quad -P_1)$ $(-P_1 \quad 0 \quad P_1)$

Table D.27 (continued)

S	1	2	3	4	5	6
1	N/A	$(10\bar{1})^{C}$ $(1\bar{a}1)^{N}$	$(01\bar{1})^{C}$ $(\bar{a}11)^{N}$	$(100)^{C}$ $(010)^{N}$	$(101)^{C}$ $(1\bar{a}\bar{1})^{N}$	$(011)^{C}$ $(\bar{a}1\bar{1})^{N}$
2	$(10\bar{1})^{C}$ $(1\bar{a}1)^{N}$	N/A	$(1\bar{1}0)^{C}$ $(11\bar{a})^{N}$	$(101)^{C}$ $(1a\bar{1})^{N}$	$(010)^{N}$ $(001)^{C}$	$(110)^{N}$ $(1\bar{1}a)^{C}$
3	$(01\bar{1})^{C}$ $(\bar{a}11)^{N}$	$(1\bar{1}0)^{C}$ $(11\bar{a})^{N}$	N/A	$(011)^{N}$ $(a1\bar{1})^{C}$	$(110)^{N}$ $(1\bar{1}\bar{a})^{C}$	$(100)^{N}$ $(001)^{C}$
4	$(100)^{N}$ $(010)^{N}$	$(101)^{C}$ $(1a\bar{1})^{N}$	$(011)^{C}$ $(a1\bar{1})^{N}$	N/A	$(10\bar{1})^{C}$ $(1a1)^{N}$	$(01\bar{1})^{N}$ $(a11)^{C}$
5	$(101)^{C}$ $(1\bar{a}\bar{1})^{N}$	$(010)^{N}$ $(001)^{N}$	$(110)^{C}$ $(1\bar{1}\bar{a})^{N}$	$(10\bar{1})^{C}$ $(1a1)^{N}$	N/A	$(1\bar{1}0)^{C}$ $(11a)^{N}$
6	$(011)^{C}$ $(\bar{a}1\bar{1})^{N}$	$(110)^{C}$ $(1\bar{1}a)^{N}$	$(100)^{N}$ $(001)^{N}$	$(01\bar{1})^{C}$ $(a11)^{N}$	$(1\bar{1}0)^{C}$ $(11a)^{N}$	N/A

$a = \varepsilon_6/(\varepsilon_3 - \varepsilon_1)$

Table D.28 Tetragonal to tetragonal, trigonal to trigonal, hexagonal to trigonal, and hexagonal to hexagonal. Structure of tensor components is the same in all species listed, but the coordinate system is chosen for parent phase of each species

All species	$4/mmm \to 4$ $4/mmm \to 4\,mm$ $4/m \to 4$ $422 \to 4$	$\bar{3}m \to 3$ $\bar{3}m \to 3m$ $\bar{3} \to 3$ $32 \to 3$	$6/mmm \to 3_z m_x$ $6/mmm \to 3$ $6/m \to 3$ $\bar{6}m2 \to 3_z m_x$ $\bar{6}m2 \to 3\ \bar{6} \to 3$ $622 \to 3$	$6/mmm \to 6\,mm$ $6/mmm \to 6$ $6/m \to 6$ $622 \to 6$
strains	polarizations	polarizations	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0\ \ 0\ \ P_3)$ $(0\ \ 0\ \ -P_3)$			

Table D.29 Cubic to tetragonal

All species	$m\bar{3}m \to 4_z m_x m_{xy}$ $m\bar{3}m \to \bar{4}_z 2_x m_{xy} (P=0)$ $m\bar{3}m \to \bar{4}_z 2_{xy} m_x (P=0)$ $m\bar{3}m \to 4_z 2_x 2_{xy} (P=0)$ $m\bar{3}m \to \bar{4}(P=0)$ $m\bar{3}m \to 4\ m\bar{3}m \to 4_z/m_z m_x m_y (P=0)$ $m\bar{3}m \to 4_z/m_z (P=0)$	$432 \to 4$ $\bar{4}3m \to \bar{4}_z 2_x m_{xy} (P=0)$ $\bar{4}3m \to \bar{4}(P=0)$ $432 \to 4_z 2_x 2_{xy} (P=0)$
strains	polarizations	polarizations
1 $\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_3 \\ 0 & 0 & 0 \end{pmatrix}$	$(0\ \ 0\ \ P_3)$ $(0\ \ 0\ \ -P_3)$	$(0\ \ 0\ \ P_3)$ $(0\ \ 0\ \ -P_3)$
2 $\begin{pmatrix} \varepsilon_3 & \varepsilon_1 & \varepsilon_1 \\ 0 & 0 & 0 \end{pmatrix}$	$(P_3\ \ 0\ \ 0)$ $(-P_3\ \ 0\ \ 0)$	$(P_3\ \ 0\ \ 0)$ $(-P_3\ \ 0\ \ 0)$
3 $\begin{pmatrix} \varepsilon_1 & \varepsilon_3 & \varepsilon_1 \\ 0 & 0 & 0 \end{pmatrix}$	$(0\ \ P_3\ \ 0)$ $(0\ \ -P_3\ \ 0)$	$(0\ \ P_3\ \ 0)$ $(0\ \ -P_3\ \ 0)$

Table D.29 (continued)

S	1	2	3
1	N/A	$(10\bar{1})^{C}$ $(101)^{N}$	$(011)^{N}$ $(01\bar{1})^{C}$
2		N/A	$(110)^{N}$ $(1\bar{1}0)^{C}$
3			N/A

Table D.30 Cubic to trigonal species

All species		$m\bar{3}m \to 3_{xyz}m_{\bar{x}y}$ $m\bar{3}m \to \bar{3}_{xyz}m_{\bar{x}y}$ $(P=0)$ $m\bar{3}m \to 3_{xyz}2_{\bar{x}y}(P=0)$ $m\bar{3}m \to \bar{3}_{xyz}(P=0)$ $m\bar{3}m \to 3_{xyz}$	$432 \to 3_{xyz}2_{\bar{x}y}$ $(P=0)$ $432 \to 3_{xyz}$	$\bar{4}3m \to 3_{xyz}m_{\bar{x}y}$ $\bar{4}3m \to 3_{xyz}$	$m\bar{3} \to 3_{xyz}$ $m\bar{3} \to \bar{3}_{xyz}(P=0)$ $23 \to 3_{xyz}$ (upper polarizations only)
strains		polarizations	polarizations	polarizations	polarizations
1	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_1 \\ \varepsilon_6 & \varepsilon_6 & \varepsilon_6 \end{pmatrix}$	$(P_1 \quad P_1 \quad P_1)$ $(-P_1 \quad -P_1 \quad -P_1)$	$(P_1 \quad P_1 \quad P_1)$ $(-P_1 \quad -P_1 \quad -P_1)$	$(P_1 \quad P_1 \quad P_1)$	$(P_1 \quad P_1 \quad P_1)$ $(-P_1 \quad -P_1 \quad -P_1)$
2	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_1 \\ \varepsilon_6 & -\varepsilon_6 & -\varepsilon_6 \end{pmatrix}$	$(-P_1 \quad P_1 \quad P_1)$ $(P_1 \quad -P_1 \quad -P_1)$	$(-P_1 \quad P_1 \quad P_1)$ $(P_1 \quad -P_1 \quad -P_1)$	$(P_1 \quad -P_1 \quad -P_1)$	$(P_1 \quad -P_1 \quad -P_1)$ $(-P_1 \quad P_1 \quad P_1)$
3	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_1 \\ -\varepsilon_6 & -\varepsilon_6 & \varepsilon_6 \end{pmatrix}$	$(-P_1 \quad -P_1 \quad P_1)$ $(P_1 \quad P_1 \quad -P_1)$	$(-P_1 \quad -P_1 \quad P_1)$ $(P_1 \quad P_1 \quad -P_1)$	$(-P_1 \quad -P_1 \quad P_1)$	$(-P_1 \quad -P_1 \quad P_1)$ $(P_1 \quad P_1 \quad -P_1)$
4	$\begin{pmatrix} \varepsilon_1 & \varepsilon_1 & \varepsilon_1 \\ -\varepsilon_6 & \varepsilon_6 & -\varepsilon_6 \end{pmatrix}$	$(P_1 \quad -P_1 \quad P_1)$ $(-P_1 \quad P_1 \quad -P_1)$	$(P_1 \quad -P_1 \quad P_1)$ $(-P_1 \quad P_1 \quad -P_1)$	$(-P_1 \quad P_1 \quad -P_1)$	$(-P_1 \quad P_1 \quad -P_1)$ $(P_1 \quad -P_1 \quad P_1)$

Table D.30 (continued)

$m\bar{3}m \to \bar{3}_{xyz}m_{\bar{x}y}(P=0)$, $m\bar{3}m \to 3_{xyz}m_{\bar{x}y}$, $m\bar{3}m \to 3_{xyz}2_{\bar{x}y}(P=0)$, $m\bar{3}m \to \bar{3}_{xyz}(P=0)$, $m\bar{3}m \to 3_{xyz}$; $432 \to 3_{xyz}2_{\bar{x}y}(P=0)$, $432 \to 3_{xyz}$ (above diagonal); $\bar{4}3m \to 3_{xyz}m_{\bar{x}y}$, $\bar{4}3m \to 3_{xyz}$; $m\bar{3} \to \bar{3}_{xyz}(P=0)$, $m\bar{3} \to 3_{xyz}$, $23 \to 3_{xyz}$ (below diagonal)

S	1	2	3	4
1	N/A	$(100)^{C}$ $(011)^{N}$	$(001)^{N}$ $(110)^{C}$	$(010)^{C}$ $(101)^{N}$
2	$(100)^{N}$ $(011)^{C}$	N/A	$(010)^{C}$ $(10\bar{1})^{N}$	$(001)^{N}$ $(1\bar{1}0)^{C}$
3	$(001)^{N}$ $(110)^{C}$	$(010)^{N}$ $(10\bar{1})^{C}$	N/A	$(100)^{C}$ $(01\bar{1})^{N}$
4	$(010)^{N}$ $(101)^{C}$	$(001)^{N}$ $(1\bar{1}0)^{C}$	$(100)^{N}$ $(01\bar{1})^{C}$	N/A

Appendix E
Piezoelectric Coefficients in Ferroelectric Phases of $BATiO_3$-Type Perovskites

Tables of this appendix give the d-piezoelectric coefficients in ferroelectric phases of $BaTiO_3$-type perovskites calculated as a result of linearization of the electrostrictive equation. Rows stand for domain states (DS) represented in Fig. 2.3.5. Piezoelectric coefficients are related to the cubic coordinate system. The meaning of symbols a, b, c, d, and e in each phase is shown below each table.

Table E.1 Tetragonal phase (species $m\bar{3}m$–$4mm$)

DS	$\mathbf{P}_S$	d_{11}	d_{12}	d_{13}	d_{15}	d_{16}	d_{21}	d_{22}	d_{23}	d_{24}	d_{26}	d_{31}	d_{32}	d_{33}	d_{34}	d_{35}
1	100	c	b	b	0	0	0	0	0	0	a	0	0	0	0	a
2	$\bar{1}00$	–b	–c	–b	0	0	0	0	0	0	–a	0	0	0	0	–a
3	010	0	0	0	0	a	b	c	b	0	0	0	0	0	a	0
4	$0\bar{1}0$	0	0	0	0	–a	–b	–c	–b	0	0	0	0	0	–a	0
5	001	0	0	0	a	0	0	0	0	a	0	b	b	c	0	0
6	$00\bar{1}$	0	0	0	–a	0	0	0	0	–a	0	–b	–b	–c	0	0

a $= 2Q_{44}P_S\chi_{33}$
b $= 2Q_{12}P_S\chi_{11}$
c $= 2Q_{11}P_S\chi_{11}$

Components of the permittivity correspond to the matrix of permittivity for DS-1 given below

$$\begin{pmatrix} \chi_{11} & & \\ & \chi_{33} & \\ & & \chi_{33} \end{pmatrix}$$

Table E.2 Orthorhombic phase (species $m\bar{3}m$–$mm2$)

DS	$\mathbf{P}_S$	d_{11}	d_{12}	d_{13}	d_{15}	d_{16}	d_{21}	d_{22}	d_{23}	d_{24}	d_{26}	d_{31}	d_{32}	d_{33}	d_{34}	d_{35}
1	110	d	c	b	0	e	c	d	b	0	e	0	0	0	a	a
2	$\bar{1}\bar{1}0$	–d	–c	–b	0	–e	–c	–d	–b	0	–e	0	0	0	–a	–a
3	$1\bar{1}0$	d	c	b	0	–e	–c	–d	–b	0	e	0	0	0	–a	a
4	$\bar{1}10$	–d	–c	–b	0	e	c	D	b	0	–e	0	0	0	a	–a
5	011	0	0	0	a	a	b	D	c	e	0	b	c	d	e	0
6	$0\bar{1}\bar{1}$	0	0	0	–a	–a	–b	–d	–c	–e	0	–b	–c	–d	–e	0
7	$01\bar{1}$	0	0	0	–a	a	b	D	c	–e	0	–b	–c	–d	e	0
8	$0\bar{1}1$	0	0	0	a	–a	–b	–d	–c	e	0	b	c	d	–e	0
9	101	d	b	c	e	0	0	0	0	a	a	c	b	d	0	e
10	$\bar{1}0\bar{1}$	–d	–b	–c	–e	0	0	0	0	–a	–a	–c	–b	–d	0	–e
11	$\bar{1}01$	–d	–b	–c	e	0	0	0	0	a	–a	c	b	d	0	–e
12	$10\bar{1}$	d	b	c	–e	0	0	0	0	–a	a	–c	–b	–d	0	e

a = $\sqrt{2}\,Q_{44}P_S\chi_{11}$
b = $\sqrt{2}\,Q_{12}P_S\,(\chi_{33} + \chi_{23})$
c = $\sqrt{2}\,P_S\,(Q_{12}\chi_{33} + Q_{11}\chi_{23})$
d = $\sqrt{2}\,P_S\,(Q_{11}\chi_{33} + Q_{12}\chi_{23})$
e = $\sqrt{2}\,Q_{44}P_S\,(\chi_{33} + \chi_{23})$

Components of the permittivity correspond to the matrix of permittivity for DS-5 given below

$$\begin{pmatrix} \chi_{11} & & \\ & \chi_{33} & \chi_{33} \\ & \chi_{33} & \chi_{33} \end{pmatrix}$$

Table E.3 Rhombohedral phase (species $m\bar{3}m$–$3m$)

DS	$\mathbf{P}_S$	d_{11}	d_{12}	d_{13}	d_{14}	d_{15}	d_{16}	d_{21}	d_{22}	d_{23}	d_{24}	d_{25}	d_{26}	d_{31}	d_{32}	d_{33}	d_{34}	d_{35}	d_{36}
1	111	a	b	b	d	c	c	B	a	b	c	d	c	b	b	a	c	c	d
2	$\bar{1}\bar{1}\bar{1}$	–a	b	–b	–d	–c	–c	–b	–a	–b	–c	–d	–c	–b	–b	–a	–c	–c	–d
3	$11\bar{1}$	a	b	b	–d	–c	c	B	a	b	–c	–d	c	–b	–b	–a	c	c	–d
4	$\bar{1}\bar{1}1$	–a	–b	–b	d	c	–c	–b	–a	–b	c	d	–c	b	b	a	–c	–c	d
5	$1\bar{1}1$	a	b	b	–d	c	–c	–b	–a	–b	c	–d	c	b	b	a	–c	c	–d
6	$\bar{1}1\bar{1}$	–a	–b	–b	d	–c	c	B	a	b	–c	d	–c	–b	–b	–a	c	–c	d
7	$\bar{1}11$	–a	–b	–b	–d	c	c	B	a	b	c	–d	–c	b	b	a	c	–c	–d
8	$1\bar{1}\bar{1}$	a	b	b	d	–c	–c	–b	–a	–b	–c	d	c	–b	–b	–a	–c	c	d

$$a = (2/\sqrt{3})\, P_S(Q_{11}\chi_{11} + 2Q_{12}\chi_{12})$$

$$b = (2/\sqrt{3})\, P_S[(Q_{12}\chi_{11} + (Q_{12} + Q_{11})\chi_{12}]$$

$$c = (2/\sqrt{3})\, P_S\, Q_{44}\,(\chi_{11} + \chi_{12})$$

$$d = (4/\sqrt{3})\, P_S\, Q_{44}\,\chi_{12}$$

Components of the permittivity correspond to the matrix of permittivity for DS-1 given below

$$\begin{pmatrix} \chi_{11} & \chi_{12} & \chi_{12} \\ \chi_{12} & \chi_{11} & \chi_{12} \\ \chi_{12} & \chi_{12} & \chi_{11} \end{pmatrix}$$

Appendix F
Tensors: Properties and Notations

Transformation Laws for Tensors

Transformation law for a second-rank tensor:

$$T'_{ip} = a_{ij} a_{pq} T_{jq}.$$

Transformation law for an nth-rank tensor:

$$M'_{\underset{n}{\underline{ij...pt}}} = \underset{n}{\underline{a_{ii'} a_{jj'} \ldots a_{pp'} a_{tt'}}} M_{\underset{n}{\underline{ij...pt}}}.$$

Here n under the lines indicate the number of a's in the product or total number of suffices. Summation over repeated (dummy) suffices from 1 to 3 is implied (Einstein convention). The tensor in the original orthogonal reference frame $(X_1 \quad X_2 \quad X_3)$ is written without the prime. The tensor in the transformed orthogonal reference frame $(X'_1 \quad X'_2 \quad X'_3)$ is written with the prime. The table of the direction cosines for transformation of the reference frame $(X_1 \quad X_2 \quad X_3) \Rightarrow (X_1{}' \quad X_2{}' \quad X_3{}')$ is denoted as

$$a_{ij} = \cos(X'_i \wedge X_j).$$

Transformation law for an nth-rank pseudotensor:

$$M'_{\underset{n}{\underline{ij...pt}}} = \underset{n}{\underline{a_{ii'} a_{jj'} \ldots a_{pp'} a_{tt'}}} M_{\underset{n}{\underline{ij...pt}}} \det(a)$$

Voight Notations for Tensors

Stress vector: $\sigma_n = (\sigma_{11} \quad \sigma_{22} \quad \sigma_{33} \quad \sigma_{23} \quad \sigma_{13} \quad \sigma_{12})$
Strain vector: $\varepsilon_n = (\varepsilon_{11} \quad \varepsilon_{22} \quad \varepsilon_{33} \quad 2\varepsilon_{23} \quad 2\varepsilon_{13} \quad 2\varepsilon_{12})$
Hook's law: $\sigma_n = s_{nm}\varepsilon_m$ and $\varepsilon_n = s_{nm}\sigma_m$ with the summation over dummy suffices: $n, m = 1 - 6$.

Stiffness and compliance symmetric matrices:

$$c_{mn} = \begin{pmatrix} c_{1111} & c_{1122} & c_{1131} & c_{1123} & c_{1113} & c_{1112} \\ & c_{2222} & c_{2233} & c_{2223} & c_{2213} & c_{2212} \\ & & c_{3333} & c_{3323} & c_{3313} & c_{3312} \\ & & & c_{2323} & c_{2313} & c_{2312} \\ & & & & c_{1313} & c_{1312} \\ & & & & & c_{1212} \end{pmatrix},$$

$$s_{mn} = \begin{pmatrix} s_{1111} & s_{1122} & s_{1131} & 2s_{1123} & 2s_{1113} & 2s_{1112} \\ & s_{2222} & s_{2233} & 2s_{2223} & 2s_{2213} & 2s_{2212} \\ & & s_{3333} & 2s_{3323} & 2s_{3313} & 2s_{3312} \\ & & & 4s_{2323} & 4s_{2313} & 4s_{2312} \\ & & & & 4s_{1313} & 4s_{1312} \\ & & & & & 4s_{1212} \end{pmatrix}.$$

Direct and converse piezoelectric effects: $P_i = d_{in}\sigma_n$ and $\varepsilon_n = d_{in}E_i$, with the summation over dummy suffices: $n = 1 - 6,\ i = 1 - 3$.

Matrix of piezoelectric d-coefficients:

$$d_{in} = \begin{pmatrix} d_{111} & d_{122} & d_{133} & 2d_{123} & 2d_{113} & 2d_{112} \\ d_{211} & d_{222} & d_{233} & 2d_{223} & 2d_{213} & 2d_{212} \\ d_{311} & d_{322} & d_{333} & 2d_{323} & 2d_{313} & 2d_{312} \end{pmatrix}.$$

Notation for Symmetry of Tensors

$[V^2]$ – symmetric second-rank tensor: $q_{ij} = q_{ji}$.
$\{V^2\}$ – antisymmetric second-rank tensor: $q_{ij} = -q_{ji}$.
V^2 – second-rank tensor.
$\varepsilon[V^2]$ – symmetric second-rank pseudotensor: $q_{ij} = q_{ji}$.
$\varepsilon\{V^2\}$ – antisymmetric second-rank pseudotensor: $q_{ij} = -q_{ji}$.
εV^2 – second-rank pseudotensor.
$[V^3]$ – third-rank tensor symmetric with respect to all indices.
$V[V^2]$ – third-rank tensor symmetric with respect to two indices: $q_{ijk} = q_{ikj}$.
$\{V^2\}V$ – third-rank tensor antisymmetric with respect to two indices: $q_{ijk} = -q_{jik}$.
V^3 – third-rank tensor.
$\varepsilon V[V^2]$ – third-rank pseudotensor symmetric with respect to two indices: $q_{ijk} = q_{ikj}$.
$\varepsilon\{V^2\}V$ – third-rank pseudotensor antisymmetric with respect to two indices: $q_{ijk} = -q_{jik}$.

$[V^4]$ – fourth-rank tensor symmetric with respect to all indices.
$V[V^3]$ – fourth-rank tensor symmetric with respect to the last three indices.
$[[V^2]^2]$ – fourth-rank tensor symmetric with respect to two pairs of indices under permutations: $q_{ijkl} = q_{jikl} = q_{ijlk} = q_{klij}$.
$[(V^2)]^2$ – fourth-rank tensor symmetric with respect to the permutations of the pairs of indices: $q_{ijkl} = q_{klij}$.
$\{V^2\,V^2\}$ – fourth-rank tensor antisymmetric with respect to the permutations of the pairs of indices: $q_{ijkl} = -q_{klij}$.
$[V^2]V^2$ – fourth-rank tensor symmetric with respect to two indices: $q_{ijkl} = q_{jikl}$.
V^4 – fourth-rank tensor.

References

Abboud, B., Le Bihan, R., Michelet, A., M'Bama, F., Hilczer, B., Ferroelectrics **140**, 45 (1993)
Abe, R., J. Phys. Soc. Jpn. **13**, 244 (1958)
Abe, R., Jpn. J. Appl. Phys. **3**, 243 (1964)
Abe, K., J. Phys. Soc. Jpn. **56**, 757 (1987)
Abe, K., Komatsu, S., Yanase, N., Sano, K., Kawakubo, T., Jpn. J. Appl. Phys. **36**, 5846 (1997)
Abe, K., Yanase, N., Kawakubo, T., Jpn. J. Appl. Phys. **39**, 4059 (2000)
Abe, K., Yanase, N., Yasamoto, T., Kawakubo, T., J. Appl. Phys. **91**, 323 (2002)
Abplanalp, M., Eng, L.M., Günter, P., Appl. Phys. A **66**, S231 (1998)
Afonikova, N.S., Shmyt'ko, I.M., Shekhtman, V.Sh., Izvestiya Akad. Nauk SSSR, ser. fiz. **43**, 1611 (1979)
Afonikova, N.S., Borovikov, V.V., Shmyt'ko, I.M., Sov. Phys. Solid State **29**, 462 (1987)
Agranovich, V.M., Ginzburg, V.L., Crystal Optics with Accounting for Spatial Dispersion and the Theory of Excitons. Nauka, Moscow (1979)
Agronin, A., Rosenwaks, Y., Rosenman, G., Appl. Phys. Lett. **85**, 452 (2004)
Ahluwalia, R., Cao, W., Ferroelectrics **251**, 191 (2001)
Ahluwalia, R., Cao, W., J. Appl. Phys. **93**, 537 (2003)
Ahn, C.H., Tybell, T., Antognazza, L., Char, K., Hammond, R.H., Beasley, M.R., Fischer, O., Triscone, J.-M., Science **276**, 1100 (1997)
Aizu, K., Phys. Rev. **140**, A590 (1965)
Aizu, K., Phys. Rev. **146**, 423 (1966)
Aizu, K., J. Phys. Soc. Jpn. **27**, 387 (1969)
Aizu, K., J. Phys. Soc. Jpn. **28**, 706 (1970a)
Aizu, K., Phys. Rev. B **2**, 754 (1970b)
Aizu, K., J. Phys. Soc. Jpn. **32**, 1287 (1972)
Aizu, K., J. Phys. Soc. Jpn. **35**, 180 (1973a)
Aizu, K., J. Phys. Soc. Jpn. **34**, 121 (1973b)
Akaba, N., Suzuki, S., Takagi, M., J. Phys. Soc. Jpn. **46**, 1583 (1979)
Akbas, M.A., Davies, P.K., J. Am. Ceram. Soc. **80**, 2933 (1997)
Aknazarov, S.Kh., Shabel'nikov, L.G., Shekhtman, V.Sh., Sov. Phys. Solid State **17**, 16 (1975)
Al-Shareef, H.N., Tuttle, B.A., Warren, W.L., Headley, T.J., Dimos, D., Voigt, J.A., Nasby, R.D., J. Appl. Phys. **79**, 1013 (1996)
Aleshko-Ozhevskij, O.P., Ferroelectrics **48**, 157 (1983)
Aleshko-Ozhevskij, O.P., Bowen, D.K., Davies, S.T., Ferroelectrics **62**, 53 (1985)
Alexe, M., Gruverman, A. (eds.): Ferroelectrics at Nanoscale: Scanning Probe Microscopy Approach. Springer, New York (2004)
Alexe, M., Harnagea, C., Hesse, D., Gösele, U., Appl. Phys. Lett. **79**, 242 (2001)
Alpay, S.P., Prakash, A.S., Aggarwal, S., Ramesh, R., Roytburd, A.L., Shuk, P., Greenblatt, M., Polydomain structure of epitaxial $PbTiO_3$ films on MgO, in Ferroelectric Thin Films

VI, edited by Treece, R.E., Jones, R.E., Foster, C.M., Desu, S.B., Yoo, I.K. (Mater. Res. Soc. Symp. Proc. **Volume 493**, p. 111, Warrendale, PA, 1998)
Alpay, S.P., Nagarajan, V., Bendersky, L.A., Vaudin, M.D., Aggarwal, S., Ramesh, R., Roytburd, A.L., J., Appl. Phys. **85**, 3271 (1999)
Alpay, S.P., Roytburd, A.L., J. Appl. Phys. **83**, 4714 (1998)
Amin, A., Newnham, R.E., Phys. Stat. Sol. (a) **61**, 215 (1980)
Anderson, J.R., Brady, G.W., Merz, W.J., Remeika, J.P., J. Appl. Phys. **26**, 1387 (1955)
Anderson, T.L., Newnham, R.E., Cross, L.E., Laughner, J.W., Phys. Stat. Sol. (a) **37**, 235 (1976)
Andrews, S.R., Cowley, R.A., J. Phys. C Solid State Phys. **19**, 615 (1986)
Anisimova, V.N., Filippov, M.N., Shuvalov, L.A., JETP Lett. **40**, 873 (1984)
Antoshin, M.K., Spivak, G.V., Izvestiya Akad. Nauk SSSR, ser. fiz. **36**, 1901 (1972)
Aoyama, J., Suzuki, S., Takagi, M., J. Phys. Soc. Jpn. **61**, 3613 (1992)
Aristov, V.V., Kokhanchik, L.S., Meyer, K.-P., Blumtritt, H., Phys. Stat. Sol. (a) **78**, 229 (1983)
Aristov, V.V., Kokhanchik, L.S., Voronovskii, Yu.I., Phys. Stat. Sol. (a) **86**, 133 (1984)
Arlt, G., J. Mater. Sci. **25**, 2655 (1990)
Arlt, G., Sasko, P., J. Appl. Phys. **51**, 4956 (1980)
Auciello, O., Gifford, K.D., Lichtenwalner, D.J., Dat, R., Al-Shareef, H.N., Bellur, K.R., Kingon, A., Integr. Ferroelectr. **6**, 173 (1995)
Auciello, O., Gruverman, A., Tokumoto, H., Integr. Ferroelectr. **15**, 107 (1997)
Avakyants, L.P., Kiselev, D.F., Chervyakov, A.V., Sov. Phys. Solid State **138**, 138 (1985)
Averty, D., Le Bihan, R., Ferroelectrics **140**, 17 (1993)
Avrami, M., J. Chem. Phys. **8**, 212 (1940)
Ayroles, R., Torres, J., Aubree, J., Roucau, C., Tanaka, M., Appl. Phys. Lett. **34**, 4 (1979)
Baginskii, I.L., Kostsov, E.G., Phys. Stat. Sol. **91**, 705 (1985)
Bah, I.S., Balyunis, L.E., Topolov, V.Yu., Fesenko, O.E., Ferroelectrics **152**, 237 (1994)
Balagurov, A.M., Beskrovnyi, A.I., Datt, I.D., Shuvalov, L.A., Schagina, N.M., Kristallografiya **31**, 1087 (1986)
Balashova, E.V., Tagantsev, A.K., Phys. Rev. B **48**, 9979 (1993)
Balyunis, L.E., Topolov, V.Yu., Bah, I.S., Turik, A.V., J. Phys. Condens. Matter **5**, 1419 (1993)
Barad, Y., Lettieri, J., Theis, C.D., Schlom, D.G., Gopalan, V., J. Appl. Phys. **89**, 1387 (2001)
Barkla, H.M., Finlayson, D.M., Philos. Mag. **44**, 109 (1953)
Barkley, J.R., Jeitschko, W., J. Appl. Phys. **44**, 938 (1973)
Baron, C., Cheng, H., Gupta, M.C., Appl. Phys. Lett. **68**, 481 (1996)
Barrett, R.C., Quate, C.F., J. Appl. Phys. **70**, 2725 (1991)
Barsch, G.R., Krumhansl, J.A., Phys. Rev. Lett. **53**, 1069 (1984)
Bartic, A.T., Wouters, D.J., Maes, H.E., Rickes, J.T., Waser, R., J. Appl. Phys. **89**, 3420 (2001)
Basceri, C., Streiffer, S.K., Kingon, A.I., Waser, R., J. Appl. Phys. **82**, 2497 (1997a)
Basceri, C., Streiffer, S.K., Kingon, A.I., Waser, R., J. Appl. Phys. **82**, 2505 (1997b)
Bastie, P.M., Bornarel, J., J. Phys. C Solid State Phys. **12**, 1785 (1979)
Bastie, P., Bornarel, J., Lajzerowicz, J., Schneider, J.R., Ferroelectrics **14**, 587 (1976)
Bastie, P., Bornarel, J., Dolino, G., Vallade, M., Ferroelectrics **26**, 789 (1980)
Batra, I.P., Silverman, B.D., Solid State Commun. **11**, 291 (1972)
Bell, A.J., Cross, L.E., Ferroelectrics **59**, 197 (1984)
Bernstein, S., Wong, T., Kisler, Y., Tustison, R., J. Mater. Res. **8**, 12 (1993)
Bertagnolli, E., Kittinger, E., Tichy, J., J. Appl. Phys. **50**, 6267 (1979)
Betzig, E., Trautman, J.K., Science **257**, 189 (1992)
Beudon, D., Le Bihan, R., Jpn. J. Appl. Phys. Suppl. **24-2**, 548 (1985)
Beudon, D., Le Bihan, R., Lompre, P., Godefroy, G., Ferroelectrics **81**, 111 (1988)
Bhalla, A., Cross, L.E., J. Mater. Sci. Lett. **12**, 2346 (1977)
Bhalla, A.S., Cross, L.E., Ferroelectrics **36**, 403 (1981)
Bhide, V.G., Bapat, N.J., J. Appl. Phys. **34**, 181 (1963)
Bhide, V.G., Chilmulgund, N.D., Indian J. Pure Appl. Phys. **3**, 253 (1965)

Biedrzycki, K., Hajir, D., Le Bihan, R., Ferroelectrics **140**, 253 (1993)
Bierlein, J.D., Ahmed, F., Appl. Phys. Lett. **51**, 1322 (1987)
Biletskii, I.N., Vlokh, R.O., Otko, A.I., Shopa, Y.I., Ukrainskii Fizicheskii Zhurnal **33**, 689 (1988)
Binggeli, B., Fatuzzo, E., J. Appl. Phys. **36**, 1431 (1965)
Bittel, H., Müser, H.E., Berndes, G., Untersuchungen über ferroelektrische Domänenwande und Nachwirkungserscheinungen. Westdeutscher Verlag, Köln und Opladen (1968)
Bjorkstam, J.L., Oettel, R.E., Proceedings of the International Meeting on Ferroelectricity, Prague 1966, vol. II, p. 91 (1966)
Bjorkstam, J.L., Oettel, R.E., Phys. Rev. **159**, 427 (1967)
Blank, H., Amelinckx, S., Appl. Phys. Lett. **2**, 140 (1963)
Blatter, G., Feigelman, M.V., Geshkenbein, V.B., Larkin, A.I., Vinokur, V.M., Rev. Mod. Phys. **66**, 1125 (1994)
Blinov, L.M., Barberi, R., Palto, S.P., J. Appl. Phys. **89**, 3960 (2001)
Blistanov, A.A., Geras'kin, V.V., Stepanova, A.V., Puchkova, M.V., Sorokin, N.G., Sov. Phys. Solid State **26**, 684 (1984)
Bloss, F.D., An Introduction to the Methods of Optical Crystallography. Holt, Rinehart and Winston, New York (1961)
Bloss, F.D., Crystallography and Crystal Chemistry: An Introduction. Holt, New York (1971)
Bluhm, H., Schwarz, U.D., Meyer, K.-P., Wiesendanger, R., Appl. Phys. A **61**, 525 (1995)
Bluhm, H., Wiesendanger, R., Meyer, K.-P., J. Vac. Sci. Technol. B **14**, 1180 (1996)
Bluhm, H., Wadas, A., Wiesendanger, R., Roshko, A., Aust, J.A., Nam, D., Appl. Phys. Lett. **71**, 146 (1997)
Bluhm, H., Schwarz, U.D., Wiesendanger, R., Phys. Rev. B **57**, 161 (1998)
Blumberg, H., Kürsten, H.D., Kristall und Technik **14**, 985 (1979)
Bolshakova, N.N., Nekrasova, G.M., Rudyak, V.M., Ferroelectrics **97**, 227 (1989)
Bond, W.L., Zeitschrift für Kristallographie **99**, 488 (1938)
Bonnell, D.A. (ed.): Scanning Probe Microscopy and Spectroscopy: Theory, Techniques, and Applications. John Wiley & Sons (2000)
Bornarel, J., J. Appl. Phys. **43**, 845 (1972)
Bornarel, J., Ferroelectrics **9**, 197 (1975)
Bornarel, J., Ferroelectrics **71**, 255 (1987)
Bornarel, J., Phase Transitions **34**, 147 (1991)
Bornarel, J., Ferroelectrics **172**, 53 (1995)
Bornarel, J., Bastie, P., J. Phys. C Solid State Phys. **13**, 5843 (1980)
Bornarel, J., Cach, R., J. Phys. Condens. Matter **5**, 2977 (1993)
Bornarel, J., Lajzerowicz, J., J. Appl. Phys. **39**, 4339 (1968)
Bornarel, J., Lajzerowicz, J., J. Phys. Soc. Jpn. Suppl. **28**, 360 (1970)
Bornarel, J., Lajzerowicz, J., J. Phys. Colloq. C2 **33 Suppl. 4**, C2–153 (1972a)
Bornarel, J., Lajzerowicz, J., Ferroelectrics **4**, 177 (1972b)
Bornarel, J., Legrand, J.F., Ferroelectrics **39**, 1127 (1981)
Bornarel, J., Fousek, J., Glogarová, M., Czech. J. Phys. B **22**, 864 (1972)
Bornarel, P., Fousková, A., Guyon, P., Lajzerowicz, J., Proceedings of the International Meeting on Ferroelectricity, Prague 1966, vol. II, p. 81 (1966)
Bornarel, J., Cach, R., Kvitek, Z., Ferroelectrics **236**, 117 (2000)
Borodina, V.A., Kuznetsov, V.G., Izvestiya Akad. Nauk SSSR, ser. fiz. **48**, 1146 (1984)
Boser, O., J. Appl. Phys. **62**, 1344 (1987)
Boulesteix, C., Yangui, B., Ben Salem, M., Manolikas, C., Amelinckx, S., J. Phys. Paris **47**, 461 (1986)
Bradt, R.C., Ansell, G.S., J. Appl. Phys. **38**, 5407 (1967)
Bradt, R.C., Ansell, G.S., IEEE Trans. Electron. Devices **16**, 594 (1969)
Bratkovsky, A.M., Levanyuk, A.P., Phys. Rev. Lett. **84**, 3177 (2000a)
Bratkovsky, A.M., Levanyuk, A.P., Phys. Rev. B **61**, 15042 (2000b)

Bratkovsky, A.M., Levanyuk, A.P., Phys. Rev. Lett. **86**, 3642 (2001a)
Bratkovsky, A.M., Levanyuk, A.P., Phys. Rev. B **64**, 134107 (2001b)
Bratkovsky, A.M., Levanyuk, A.P., Phys. Rev. B **63**, 132103 (2001c)
Bratkovsky, A.M., Levanyuk, A.P., Appl. Phys. Lett. **89**, 253108 (2006)
Bratkovsky, A.M., Levanyuk, A.P., Phys. Rev. Lett. **100**, 149701 (2008)
Bratkovsky, A.M., Marais, S.C., Heine, V., Salje, E.K.H., J. Phys. Condens. Matter **6**, 3679 (1994)
Braun, T., Kleemann, W., Dec, J., Thomas, P.A., Phys. Rev. Lett. **94**, 117601 (2005)
Brazier, M., Mansour, S., McElfresh, M., Appl. Phys. Lett. **74**, 4032 (1999)
Brazovskii, S., Nattermann, T., Adv. Phys. **53**, 177 (2004)
Brennan, C.J., Ferroelectrics **132**, 245 (1992a)
Brennan, C.J., Integr. Ferroelectr. **2**, 73 (1992b)
Brennan, C.J., Integr. Ferroelectr. **7**, 93 (1995)
Brezina, B., Fotcenkov, A.A., Czech. J. Phys. B **14**, 21 (1964)
Brezina, B., Havránková, M., Cryst. Res. Technol. **20**, 787 (1985)
Brezina, B., Fousek, J., Glanc, A., Czech. J. Phys. B **11**, 595 (1961)
Brennan, C.J., Parrella, R.D., Larsen, D.E., Ferroelectrics **151**, 33 (1994)
Brixner, L.H., Bierstedt, P.E., Jaep, W.F., Barkley, J.R., Mater. Res. Bull. **8**, 497 (1973)
Bruce, D.A., J. Phys. C Solid State Phys. **14**, 5195 (1981)
Buhlmann, S., Dwir, B., Baborowski, J., Muralt, P., Appl. Phys. Lett. **80**, 3195 (2002)
Bulaevskii, L.N., Sov. Phys. Solid State **5**, 2329 (1964)
Bulaevskii, L.N., Ginzburg, V.L., Sov. Phys. JETF **18**, 530 (1964)
Bulaevskii, L.N., Vekhter, B.G., Sov. Phys. JETF **64**, 851 (1986)
Bullbich, A.A., Gufan, Yu.M., Ferroelectrics **98**, 277 (1989)
Bune, A.V., Fridkin, V.M., Ducharme, S., Blinov, L.M., Palto, S.P., Sorokin, A.V., Yudin, S.G., Zlatkin, A., Nature **391**, 874 (1998)
Burfoot, J.C., Proc. Phys. Soc. **73**, 641 (1959)
Burfoot, J.C., Latham, R.V., Br. J. Appl. Phys. **14**, 933 (1963)
Burfoot, J.C., Taylor, G.W., Polar Dielectrics and their Applications. The Macmillan Press Ltd., London (1979)
Bursill, L.A., Peng, J.L., Nature **311**, 550 (1984)
Bursill, L.A., Peng J.L., Ferroelectrics **70**, 191 (1986)
Bursill, L.A., Peng J.L., Feng, D., Philos. Mag.A **48**, 953 (1983)
Bursill, L.A., Lin, P.J., "High resolution electron microscopy of electronic ceramic material" in Electronic Ceramic Materials, edited by Nowotny, J. (Trans-Tech Publications, pp. 421–460, 1992)
Burtsev, E.V., Chervonobrodov, S.P., Ferroelectrics **45**, 97 (1982)
Busch, G., Scherrer, P., Naturwissenschaften **23**, 737 (1935)
Bush, A.A., Venevtsev, Yu.N., Fizika tverdogo tela **28**, 1970 (1986)
Cady, W.G., Piezoelectricity. McGraw-Hill, New York (1946)
Cahn, R.W., Adv. Phy. **3**, 363 (1954)
Cahn, J.W., Acta Metallur. **8**, 554 (1960)
Callaby, D.R., J. Appl. Phys. **36**, 2751 (1965)
Callaby, D.R., J. Appl. Phys. **38**, 431 (1967)
Cameron, D.P., IBM J. Res. Develop. **1**, 2 (1957)
Campbell, D.S., J. Electron. Control **3**, 330 (1957)
Campbell, D.S., Philos. Mag.**7**, 1157 (1962)
Cantoni, M., Bharadwaja, S., Gentil, S., Setter, N., J. Appl. Phys. **96**, 3870 (2004)
Cao, W., Barsch, G.R., Phys. Rev. B **41**, 4334 (1990)
Cao, W., Cross, L.E., Phys. Rev. B **44**, 5 (1991)
Cao, W., Cross, L.E., Ferroelectrics **157**, 19 (1994)
Cao, W., Randall, C., Solid State Commun. **86**, 435 (1993)
Cao, W., Barsch, G.R., Krumhansl, J.A., Phys. Rev. B **42**, 6396 (1990)
Cao, W., Tavener, S., Xie, S., J. Appl. Phys. **86**, 5739 (1999)

Capelle, B., Malgrange, C., J. Appl. Phys. **53**, 6762 (1982)
Capelle, B., Epelboin, Y., Malgrange, C., J. Appl. Phys. **53**, 6767 (1982)
Carl, K., Härdtl, K.H., Ferroelectrics **17**, 473 (1978)
Castellanos-Guzmán, A.G., Campa-Molina, J., Reyes-Gomez, J., Ferroelectrics **172**, 151 (1995)
Cáslavsky, J., Polcarová, M., Czech. J. Phys. B **14**, 454 (1964)
Cáslavsky, J., Polcarová, M., Czech. J. Phys. B **15**, 372 (1965)
Chabin, M., Ildefonse, J.P., Gilletta, F., Ferroelectrics **13**, 333 (1976)
Chabin, M., Gilletta, F., Ildefonse, J.P., J. Appl. Cryst. **10**, 247 (1977)
Chaikin, P.M., Lubensky, T.C.: Principles of Condenced Matter Physics. Cambridge University Press (1995)
Chakrabarti, B.K., Acharyya, M., Rev. Mod. Phys. **71**, 847 (1999)
Chaudhari, R.M., Krishnakumar, R., Ferroelectrics **97**, 255 (1989)
Chen, J., Zhou, Q., Hong, J.-F., Wang, W.-S., Ming, N.-B., Feng, D., Fang, C.-G., J. Appl. Phys. **66**, 336 (1989)
Chen, L., Ouyang, J., Ganpule, C.S., Nagarajan, V., Ramesh, R., Roytburd, A.L., Appl. Phys. Lett. **84**, 254 (2004)
Chenskii, E.V., Fizika tverdogo tela **14**, 2241 (1972)
Chenskii, E.V., Tarasenko, V.V., Zh. Eksp. Teor. Fiz. **83**, 1089 (1982)
Chensky, E.V., Tarasenko, V.V., Sov. Phys. JETF **56**, 521 (1982)
Chervonobrodov, S.P., Roytburd, A.L., Ferroelectrics **83**, 109 (1988)
Cho, Y., Ohara, K., Appl. Phys. Lett. **79**, 3842 (2001)
Cho, Y., Atsumi, S., Nakamura, K., Jpn. J. Appl. Phys. **36**, 3152 (1997a)
Cho, Y., Kirihara, A., Saeki, T., Jpn. J. Appl. Phys. **36**, 360 (1997b)
Cho, Y., Kazuta, S., Matsuura, K., Appl. Phys. Lett. **75**, 2833 (1999)
Cho, Y., Fujimoto, K., Hiranaga, Y., Wagatsuma, Y., Onoe, A., Terabe, K., Kitamura, K., Appl. Phys. Lett. **81**, 4401 (2002)
Choi, W.K., Choi, S.K., Lee, H.M., J. Korean Phys. Soc. **32**, S1694 (1998)
Chrosch, J., Salje, E.K.H., Physica C **225**, 111 (1994)
Chrosch, J., Salje, E.K.H., J. Appl. Phys. **85**, 722 (1999)
Chynoweth, A.G., Phys. Rev. **102**, 705 (1956)
Chynoweth, A.G., Phys. Rev. **110**, 1316 (1958)
Chynoweth, A.G., Phys. Rev. **113**, 159 (1959)
Chynoweth, A.G., Phys. Rev. **117**, 1235 (1960)
Chynoweth, A.G., Abel, J.L., J. Appl. Phys. **30**, 1615 (1959a)
Chynoweth, A.G., Abel, J.L., J. Appl. Phys. **30**, 1073 (1959b)
Chynoweth, A.G., Feldmann, W.L., J. Phys. Chem. Solids **15**, 225 (1960)
Cillessen, J.F.M., Prins, M.W.J., Wolf, R.M., J. Appl. Phys. **81**, 2777 (1977)
Clay, W., Evans, B.J., Latham, R.V., J. Phys. D Appl. Phys. **7**, 1291 (1974)
Colla, E.L., Hong, S., Taylor, D.V., Tagantsev, A.K., Setter, N., Appl. Phys. Lett. **72**, 2763 (1998a)
Colla, E.L., Tagantsev, A.K., Taylor, D., Kholkin, A.L., J. Korean Phys. Soc. (Proc. Suppl.) **32**, S1353 (1998b)
Colla, E.L., Tagantsev, A.K., Taylor, D.V., Kholkin, A.L., Integr. Ferroelectr. **18**, 19 (1997)
Colla, E.L., Taylor, D.V., Tagantsev, A.K., Setter, N., Appl. Phys. Lett. **72**, 2478 (1998c)
Collins, M.A., Blumen, A., Currie, J.F., Ross, J., Phys. Rev. B **19**, 3630 (1979)
Conti, S., Salje, E.K.H., J. Phys. Condens. Matter **13**, L847 (2001)
Cook Jr., W.R., J. Am. Ceram. Soc. **39**, 17 (1956)
Correia, A., Massanell, J., Garcia, N., Levanyuk, A.P., Zlatkin, A., Przeslawski, J., Appl. Phys. Lett. **68**, 2796 (1996)
Courtens, E., Phys. Rev. B **33**, 2975 (1986)
Cowley, J.M.: Diffraction Physics. North-Holland, Amsterdam (1975)
Cowley, R.A., Axe, J.D., Iizumi, M., Phys. Rev. Lett. **36**, 806 (1976)
Cross, L.E., Bhalla, A., Phys. Stat. Sol. (a) **48**, 431 (1978)

Cross, L.E., Cline, T.W., Ferroelectrics **11**, 333 (1976)
Cross, L.E., Nicholson, B.J., Philos. Mag. **46**, 453 (1955)
Cross, L.E., Fousková, A., Cummins, S.E., Phys. Rev. Lett. **21**, 812 (1968)
Cross, J., Fujiki. M., Tsukada, M., Kotaka, Y., Goto.Y., Integr. Ferroelectr. **21**, 263 (1998)
Cudney, R.S., Fousek, J., Zgonik, M., Günter, P., Garrett, M.H., Rytz, D., Ferroelectrics **157**, 45 (1994)
Cudney, R.S., Garces-Chavez, V., Negrete-Regagnon, P., Opt. Lett. **22**, 439 (1997)
Cummins, H.Z., Phys. Rep. **185**, 211 (1990)
Cummins, S.E., Cross, L.E., Appl. Phys. Lett. **10**, 14 (1967)
Cummins, S.E., Cross, L.E., J. Appl. Phys. **39**, 2268 (1968)
Dabrowska, K., Daszczynska, W., Jaskiewicz, A., Acta Phys. Pol. **A 51**, 539 (1977)
Damjanovic, D.: Hysteresis in piezoelectric and ferroelectric materials, in Science of Hysteresis, edited by Bertotti, G., Mayergoyz, I., pp. 337–465, Elsevier, Oxford (2005)
Darinskii, B.M., Fedosov, V.N., Sov. Phys. Solid State **13**, 17 (1971)
Darinskii, B.M., Lazarev, A.P., Sidorkin, A.S., Fizika tverdogo tela **31**, 287 (1989a)
Darinskii, B.M., Sidorkin, A.S., Lazarev, A.P., Ferroelectrics **98**, 245 (1989b)
Darinskii, B.M., Lazarev, A.P., Sidorkin, A.S., Kristallografiya **36**, 757 (1991)
David, W.I.F., Wood, I.G., J. Phys. C Solid State Phys. **16**, 5149 (1983)
De Guerville, F., Luk'yanchuk, I., Lahoche, L., El Marssi, M., Mater. Sci. Eng. B Solid State Mater.r Adv. Technol. **120**, 16 (2005)
De Wainer, L.S., De Dussel, H.L., De Benyacar, A.R., Thin Solid Films **69**, 351 (1980)
Dec, J., Ferroelectrics **81**, 123 (1988)
Dec, J., Phase Transitions **45**, 35 (1993)
Dec, J., Kwapulinski, J., J. Phys. Condens. Matter **1**, 3389 (1989)
Dec, J., Kleemann, W., Itoh, M., Ferroelectrics **298**, 163 (2004)
Dennis, M.D., Bradt, R.C., J. Appl. Phys. **45**, 1931 (1974)
Desu, S.B., Dudekevich, V.P., Dudkevich, P.V., Zakharchenko, I.N., Kushlyan, G.L.: Thermodynamics of epitaxial ferroelectric films, in Epitaxial Oxide Thin Films II, edited by Speck, J.S., Fork, D.K., Wolf, R.M., Shiosaki, T. (Mater. Res. Soc. Symp. Proc. **Volume 401**, p. 1995, Warrendale, PA, 1996)
DeVilbiss, A.D., DeVilbiss, A.J., Integr. Ferroelectr. **26**, 285 (1999)
Devonshire, A.F., Philos. Mag. **40**, 1040 (1949)
Devonshire, A.F., Philos. Mag. **42**, 1065 (1951)
Diamant, H., Drenck, K., Pepinsky, R., Rev. Sci. Instrum. **28**, 30 (1957)
DiDomenico Jr., M., Wemple, S.H., Phys. Rev. **155**, 539 (1967)
Dimos, D., Warren, W.L., Sinclair, M.B., Tuttle, B.A., Schwartz, R.W., J. Appl. Phys. **76**, 4305 (1994)
Distler, G.I., Konstantinova, V.P., Gerasimov, Yu.M., Tolmacheva, G.A., Pis'ma v ZhETF **6**, 868 (1967)
Distler, G.I., Konstantinova, V.P., Gerasimov, Y.M., Tolmacheva, G.A., Nature **218**, 762 (1968)
Dolino, G., Phys. Rev. B **6**, 4025 (1972)
Dolino, G., Appl. Phys. Lett. **22**, 123 (1973)
Dolino, G., Rev. Phys. Appl. **10**, 433 (1975)
Dolino, G., Lajzerowicz, J., Vallade, M., Solid State Commun. **7**, 1005 (1969)
Dolino, G., Lajzerowicz, J., Vallade, M., Phys. Rev. B **2**, 2194 (1970)
Dolino, G., Bachheimer, J.P., Vallade, M., Appl. Phys. Lett. **22**, 623 (1973)
Domanski, S., Proc. Phys. Soc. (London) **B72**, 306 (1958)
Dontsova, L.I., Popov, E.S., Izvestiya Akad. Nauk SSSR, ser. fiz. **39**, 854 (1975)
Dontsova, L.I., Popov, E.S., Shil'nikov, A.V., Bulatova, L.G., Tikhomirova, N.A., Shuvalov, L.A., Kristallografiya **26**, 758 (1981)
Dontsova, L.I., Bulatova, L.G., Popov, E.S., Shil'nikov, A.V., Chebotarev, A.A., Tikhomirova, N.A., Baranov, A.I., Shuvalov, L.A., Kristallografiya **27**, 305 (1982)

Dontzova, L.I., Tikhomirova, N.A., Shuvalov, L.A., Ferroelectrics **97**, 87 (1989)

Dontsova, L.I., Tikhomirova, N.A., Bulatova, L.G., Korina, R.V., Kristallografiya **33**, 450 (1988)

Dontsova, L.I., Tikhomirova, N.A., Shuvalov, L.A., Kristallografiya **39**, 158 (1994)

Dougherty, J.P., Sawaguchi, E., Cross, L.E., Appl. Phys. Lett. **20**, 364 (1972)

Drougard, M.E., Landauer, R., J. Appl. Phys. **30**, 1663 (1959)

Drougard, M.E., Young, D.R., Phys. Rev. **94**, 1561 (1954)

Drougard, M.E., Funk, H.L., Young, D.R., J. Appl. Phys. **25**, 1166 (1954)

Du, X., Chen, I.-W., J. Appl. Phys. **83**, 7789 (1998)

Ducharme, S., Bune, A., Fridkin, V., Blinov, L., Palto, S., Petukhova, N., Yudin, S., Ferroelectrics **202**, 29 (1997)

Dudnik, E.F., Shuvalov, L.A., Ferroelectrics **98**, 207 (1989)

Dudnik, E.F., Sushko, S.A., Kiosse, G.A., Malinovskiy, T.I., Ferroelectrics **48**, 149 (1983)

Duiker, H.M., Beale, P.D., Phys. Rev. **41**, 490 (1990)

Dvorak, V., J. Phys. Soc. Jpn. Suppl. **28**, 252 (1970)

Dvorak, V., Phys. Stat. Sol. (b) **45**, 147 (1971)

Dvorak, V., J. Phys. Paris **33**, C2-89 (1972)

Dvorak, V., Ferroelectrics **7**, 1 (1974)

Dvorak, V., Janovec, V., Jpn. J. Appl. Phys. **4**, 400 (1965)

Dvorak, V., Malek, Z., Mastner, J., Janovec, V., Glanc, A., J. Appl. Phys. **35**, 1875 (1964)

Eisner, J., Ferroelectrics **8**, 621 (1974)

Eknadiosyants, E.I., Borodin, V.Z., Piralova, A.T., Boldyreva, Z.P., Proskuryakov, B.F., Biryukova, T.V., Sov. Phys. Crystallogr. **23**, 218 (1978)

Eknadiosyants, E.I., Pinskaya, A.N., Borodin, V.Z., Sov. Phys. Crystallogr. **32**, 613 (1987)

Eknadiosiants, E.I., Borodin, V.Z., Smotrakov, V.G., Eremkin, V.V., Pinskaya, A.N., Ferroelectrics **111**, 283 (1990)

Eknadiosyants, E.I., Borodin, V.Z., Pinskaya, A.N., Eremkin, V.V., Smotrakov, V.G., Crystallogr. Rep. **42**, 1029 (1997)

Eng, L.M., Nanotechnology **10**, 405 (1999)

Eng, L.M., Güntherodt, H.-J., Ferroelectrics **236**, 35 (2000)

Eng, L.M., Friedrich, M., Fousek, J., Günter, P., J. Vac. Sci. Technol. B **14**, 1191 (1996)

Eng, L.M., Fousek, J., Günter, P., Ferroelectrics **191**, 211 (1997)

Eng, L.M., Bammerlin, M., Loppacher, Ch., Guggisberg, M., Bennewitz, R., Lüthi, R., Meyer, E., Güntherodt, H.-J., Appl. Surf. Sci. **140**, 253 (1999a)

Eng, L.M., Bammerlin, M., Loppacher, Ch., Guggisberg, M., Bennewitz, R., Lüthi, R., Meyer, E., Huser, Th., Heinzelman, H., Güntherodt, H.-J., Ferroelectrics **222**, 153 (1999b)

Eng, L.M., Bammerlin, M., Loppacher, Ch., Guggisberg, M., Meyer, E., Güntherodt, H.-J., Surf. Interface Anal. **27**, 422 (1999c)

Eng, L.M., Güntherodt, H.-J., Schneider, G.A., Köpke, U., Munoz Saldana, J., Appl. Phys. Lett. **74**, 233 (1999d)

English, F.L., J. Appl. Phys. **39**, 2302 (1968a)

English, F.L., J. Appl. Phys. **39**, 128 (1968b)

Erhart, J., Phase Transitions **77**, 989 (2004)

Errandonea, G., Ferroelectrics **36**, 423 (1981)

Esayan, S.Kh., Lemanov, V.V., Smolenskii, G.A., Sov. Phys. Dokl. **19**, 393 (1974)

Fally, M., Fuith, A., Müller, V., Phys. Rev. B **64**, 026101 (2001)

Fatuzzo, E., J. Appl. Phys. **32**, 1571 (1961)

Fatuzzo, E., Phys. Rev. **127**, 1999 (1962)

Fatuzzo, E., Merz, W.J., Phys. Rev. **116**, 61 (1959)

Fatuzzo, E., Merz, W.J., Ferroelectricity. North-Holland, Amsterdam (1966)

Fedorenko, A.A., Mueller, V., Stepanow, S., Phys. Rev. B **70**, 134301 (2004)

Fedosov, V.N., Sidorkin, A.S., Fizika tverdogo tela **19**, 1322 (1977)

Feisst, A., Koidl, P., Appl. Phys. Lett. **47**, 1125 (1985)

Fesenko, O.E., Smotrakov, V.G., Ferroelectrics **12**, 211 (1976)

Fesenko, E.G., Gavrilyatchenko, V.G., Martinenko, M.A., Semenchov, A.F., Ferroelectrics **6**, 61 (1973)

Fesenko, E.G., Martynenko, M.A., Gavrilyatchenko, V.G., Semenchev, A.F., Izvestiya Akad. Nauk SSSR, ser. fiz. **39**, 762 (1975)

Fesenko, E.G., Gavrilyatchenko, V.G., Semenchev, A.F., Yufatova, S.M., Ferroelectrics **63**, 289 (1985)

Fesenko, E.G., Gavrilyachenko, V.G., Semenchev, A.F., Domain Structure of Multiaxial Ferroelectric Crystals (in Russian). Publishing House of the Rostov University, Rostov on Don (1990)

Flack, H.D., Acta Cryst. **A 43**, 564 (1987)

Flippen, R.B., J. Appl. Phys. **46**, 1068 (1975)

Floquet, N., Valot, C.M., Mesnier, M.T., Niepce, J.C., Normand, L., Thorel, A., Kilaas, R., J. Phys. III **7**, 1105 (1997)

Foeth, M., Sfera, A., Stadelmann, P., Buffat, P.-A., J. Electron Microsc. **48**, 717 (1999a)

Foeth, M., Stadelmann, P., Buffat, P.-A., Ultramicroscopy **75**, 203 (1999b)

Foeth, M., Stadelmann, P., Robert, M., Phys. A –Stat. Mech Appl. **373**, 439 (2007)

Fomichev, N.N., Izvestiya Akad. Nauk SSSR, ser. fiz. **29**, 962 (1965)

Forsbergh Jr., P.W., Phys. Rev. **76**, 1187 (1949)

Foster, C.M., Li, M.B.Z., Miller, D., Baldo, P.M., Rehn, L.E., Bai, G.R., Guo, D., You, H., Merkle, K.L., J. Appl. Phys. **78**, 2607 (1995)

Foster, C.M., Bai, G.-R., Csencsit, R., Vetrone, J., Jammy, R., Wills, L.A., Carr, E., Amano, J., J. Appl. Phys. **81**, 2349 (1997)

Fousek, J., Proceedings of the European Meeting on Ferroelectricity, Saarbriicken 1969, p. 147 (1970)

Fousek, J., Czech. J. Phys. B **21**, 955 (1971)

Fousek, J., Proceedings of the International Symposium on the Applications of Ferroelectrics, Washington 1994, p. 171 (1994)

Fousek, J., J. Appl. Phys. **36**, 588 (1965a)

Fousek, J., Czech. J. Phys. B **15**, 412 (1965b)

Fousek, J., Jpn. J. Appl. Phys. **6**, 950 (1967)

Fousek, J., Brezina, B., Czech. J. Phys. B **10**, 511 (1960)

Fousek, J., Brezina, B., Czech. J. Phys. B **11**, 344 (1961)

Fousek, J., Brezina, B., J. Phys. Soc. Jpn. **19**, 830 (1964)

Fousek, J., Janousek, V., Phys. Stat. Sol. **13**, 195 (1966)

Fousek, J., Janovec, V., J. Appl. Phys. **40**, 135 (1969)

Fousek, J., Janovec, V., J. Phys. Soc. Jpn. Suppl. **28**, 380 (1970)

Fousek, J., Petzelt, J., Phys. Stat. Sol. (a) **55**, 11 (1979)

Fousek, J., Safrankova, M., Jpn. J. Appl. Phys. **4**, 403 (1965)

Fousek, J., Safrankova, M., Proceedings of the International Meeting on Ferroelectricity, Prague 1966, vol. II, p. 59 (1966)

Fousek, J., Safrankova, M., Kaczer, J., Appl. Phys. Lett. **8**, 192 (1966)

Fousek, J., Glogarová, M., Kursten, H.D., Ferroelectrics **11**, 469 (1976)

Fousek, J., Günter, P., Hagenbucher, J.J., Plesko, S., Smutny, F., Ferroelectrics **25**, 351 (1980)

Fousková, A., J. Phys. Soc. Jpn. **20**, 1625 (1965)

Fousková, A., Fousek, J., Phys. Stat. Sol. (a) **32**, 213 (1975)

Fousková, A., Janousek, V., J. Phys. Soc. Jpn. **20**, 1619 (1965)

Fouskova, A., Guyon, P., Lajzerowicz, J., C. R. Acad. Sci. Paris **262**, 907 (1966)

Franke, K., Besold, J., Haessler, W., Seegebarth, C., Surf. Sci. Lett. **302**, L283 (1994)

Fu, D.S., Suzuki, K., Kato, K., Suzuki, H., Appl. Phys. Lett. **82**, 2130 (2003)

Fuchs, E., Liesk, W., J. Phys. Chem. Solids **25**, 845 (1964)

Fujimoto, M., Sinha, B.V., Ferroelectrics **46**, 227 (1983)

Furuhata, Y., J. Phys. Soc. Jpn. Suppl. **28**, 425 (1970)

Furuhata, Y., Toriyama, K., Appl. Phys. Lett. **23**, 361 (1973)
Gadkari, S.C., Sabharwal, S.C., Ghosh, B., Indian J. Pure Appl. Phys. **24**, 289 (1986)
Galiyarova, N.M., Dontsova, L., Ferroelectrics **222**, 269 (1999)
Galtsev, V.V., Nedostup, N.A., Ivanov, N.R., Tikhomirova, N.A., Ferroelectrics **111**, 217 (1990)
Gan, Q., Wasa, K., Eom, C.B., Mater. Sci. Eng. B **56**, 204 (1998)
Ganpule, C.S., Nagarajan, V., Li, H., Ogale, A.S., Steinhauer, D.E., Aggarwal, S., Williams, E., Wolf, P.D., Appl. Phys. Lett. **77**, 292 (2000a)
Ganpule, C.S., Nagarajan, V., Ogale, S.B., Roytburd, A.L., Williams, E.D., Appl. Phys. Lett. **77**, 3275 (2000b)
Ganpule, C.S., Nagarajan, V., Hill, B.K., Roytburd, A.L., Williams, E.D., Alpay, S.P., Roelofs, A., Waser, R., Eng, L.M., J. Appl. Phys. **91**, 1477 (2002)
Gao, C., Duewer, F., Lu, Y., Xiang, X.-D., Appl. Phys. Lett. **73**, 1146 (1998)
Gentner, J.O., Gerthsen, P., Schmidt, N.A., Send, R.E., J. Appl. Phys. **49**, 4485 (1978)
Gerra, G., Tagantsev, A.K., Setter, N., Phys. Rev. Lett. **94**, 107602 (2005)
Gerra, G., Tagantsev, A.K., Setter, N., Parlinski, K., Phys. Rev. Lett. **96**, 107603 (2006)
Gilletta, F., Phys. Stat. Sol. (a) **11**, 721 (1972)
Gladkii, V.V., Magataev, V.K., Sidnenko, E.V., Ferroelectrics **5**, 107 (1973)
Glanc, A., Málek, Z., Mastner, J., Novák, M., Strajblová, J., J. Appl. Phys. **35**, 1870 (1964)
Glazer, A.M., Groves, P., Smith, D.T., J. Phys. E Sci. Instrum. **17**, 95 (1984)
Glogarová, M.: Anchoring of MBBA liquid crystal on ferroelectric triglycine sulphate, in Advances in Liquid Crystals and Applications, edited by Bata, L., pp. 1107–1113, Pergamon Press, Akademiai Kiado, Oxford, Budapest (1980)
Glogarová, M., J. Phys. Paris **42**, 1569 (1981)
Glogarová, M., Fousek, J., Phys. Stat. Sol. (a) **15**, 579 (1972)
Glogarová, M., Janovec, V., Tikhomirova, N.A., J. Phys. Paris suppl. **40, Colloque C3**, C3–502 (1979)
Glushkov, V.F., Magataev, V.K., Svinarev, V.V., Von Cieminski, J., Shuvalov, L.A., Sov. Phys. Crystallogr. **32**, 416 (1987)
Gonzales, G., Serna, J., Ferroelectrics **54**, 305 (1984)
Gopalan, V., Gupta, M.C., Ferroelectrics **198**, 49 (1997)
Gopalan, V., Raj, R., Appl. Phys. Lett. **68**, 1323 (1996)
Gopalan, V., Raj, R., J. Appl. Phys. **81**, 865 (1997)
Gopalan, V., Mitchell, T.E., Furukawa, Y., Kitamura, K., Appl. Phys. Lett. **72**, 1981 (1998)
Goulpeau, L., Phys. Stat. Sol. **32**, K1 (1969)
Grabar, A.A., Bercha, A.I., Simchera, V.Yu., Stoika, I.M., Ferroelectrics **202**, 211 (1997)
Grandet, G., Le Bihan, R., Derrien, J., Pilorget, L., Ferroelectrics **39**, 1225 (1981)
Gränicher, H., Müller, K.A., Mater. Res. Bull. **6**, 977 (1971)
Grekov, A.A., Adonin, A.A., Protsenko, N.P., Ferroelectrics **13**, 483 (1976)
Gridnev, S.A., Shuvalov, L.A., Ferroelectrics **48**, 113 (1983)
Gridnev, S.A., Kudryash, V.I., Shuvalov, L.A., Izvestiya Akad. Nauk SSSR, ser. fiz. **43**, 1718 (1979)
Gridnev, S.A., Kudryash, V.I., Prasolov, B.N., Dybov, V.T., Ferroelectrics **111**, 233 (1990)
Grossmann, M., Bolten, D., Lohse, O., Boettger, U., Waser, R., Tiedke, S., Appl. Phys. Lett. **77**, 3830 (2000)
Grossmann, M., Lohse, O., Bolten, D., Boettger, U., Schneller, T., Waser, R., J. Appl. Phys. **92**, 2680 (2002a)
Grossmann, M., Lohse, O., Bolten, D., Boettger, U., Waser, R., J. Appl. Phys. **92**, 2688 (2002b)
Grubsky, V., MacCormack, S., Feinberg, J., Opt. Lett. **21**, 6 (1996)
Gruverman, A., Ikeda, Y., Jpn. J. Appl. Phys. **37**, L939 (1998)

Gruverman, A., Tanaka, M., J. Appl. Phys. **89**, 1836 (2001)
Gruverman, A., Auciello, O., Tokumoto, H., J. Vac. Sci. Technol. B **14**, 602 (1996)
Gruverman, A., Tokumoto, H., Prakash, A.S., Aggarwal, S., Yang, B., Wuttig, M., Ramesh, R., Auciello, O., Venkatesan, T., Appl. Phys. Lett. **71**, 3492 (1997a)
Gruverman, A.L., Hatano, J., Tokumoto, H., Jpn. J. Appl. Phys. **36**, 2207 (1997b)
Gruverman, A., Auciello, O., Tokumoto, H., Annu. Rev. Mater. Sci. **28**, 101 (1998a)
Gruverman, A., Auciello, O., Tokumoto, H., Integr. Ferroelectr. **19**, 49 (1998b)
Gruverman, A., Rodriguez, B.J., Kingon, A.I., Nemanich, R.J., Cross, J.S., Tsukada, M., Appl. Phys. Lett. **82**, 3071 (2003)
Gupta, M.C., Risk, W.P., Nutt, A.C.G., Lau, S.D., Appl. Phys. Lett. **63**, 1167 (1993)
Guymont, M., Phys. Rev. B **24**, 2647 (1981)
Guymont, M., Acta Cryst. **A 47**, 559 (1991)
Guyon, P., Lajzerowicz, J., Phys. Stat. Sol. **16**, 525 (1966)
Günter, P., Huignard, J.-P. (eds.): Photorefractive Materials and their Applications. Springer-Verlag, Berlin (1988)
Güthner, P., Dransfeld, K., Appl. Phys. Lett. **61**, 1137 (1992)
Ha, D.-H., Kim, J.-J., Jpn. J. Appl. Phys. Suppl. **24–2**, 556 (1985)
Hadni, A., Proceedings of the Symposium on Submillimeter Waves, Polytech. Inst., Brooklyn 1970, p. 251 (1970)
Hadni, A., Ferroelectrics **140**, 25 (1993)
Hadni, A., Thomas, R., Phys. Stat. Sol. (a) **31**, 71 (1975)
Hadni, A., Thomas, R., Ferroelectrics **11**, 493 (1976)
Hadni, A., Henninger, Y., Thomas, R., Schumachen, P., J. Phys. Paris **26**, 345 (1965)
Hadni, A., Lambert, J.P., Pradhan, M.M., Thomas, R., Infrared Phys. **13**, 305 (1973)
Hadni, A., Bassia, J.M., Gerbaux, X., Thomas, R., Appl. Opt. **15**, 2150 (1976)
Hadni, A., Thomas, R., Ungar, S., Gerbaux, X., Ferroelectrics **47**, 201 (1983)
Haeni, J.H., Irvin, P., Chang, W., Uecker, R., Reiche, P., Li, Y.L., Choudhury, S., Tian, W., Hawley, M.E., Craigo, B., Tagantsev, A.K., Pan, X.Q., Streiffer, S.K., Chen, L.Q., Kirchoefer, S.W., Levy, J., Schlom, D.G., Nature **430**, 758 (2004)
Haertling, G.H., Integr. Ferroelectr. **14**, 219 (1997)
Hagemann, H.-J., J. Phys. C Solid State Phys. **11**, 3333 (1978)
Hamano, K., Zhang, J., Abe, K., Mitsui, T., Sakata, H., Ema, K., Ferroelectrics **172**, 165 (1995)
Hamano, K., Zhang, J., Abe, K., Mitsui, T., Sakata, H., Ema, K., J. Phys. Soc. Jpn. **65**, 142 (1996)
Hamazaki, S.I., Shimizu, F., Kojima, S., Takashige, M., J. Korean Phys. Soc. (Proc. Suppl.) **29**, S503 (1996)
Hamazaki, S.I., Tashiro, N., Fukurai, Y., Shimizu, F., Takashige, M., Kojima, S., Ferroelectrics **219**, 183 (1998)
Hartmann, E., Windsch, W., Phys. Stat. Sol. (a) **13**, 119 (1972)
Hashimoto, S., Orihara, H., Ishibashi, Y., J. Phys. Soc. Jpn. **63**, 1601 (1994)
Hatano, J., Le Bihan, R., Ferroelectrics **111**, 223 (1990)
Hatano, J., Suda, F., Futama, H., Jpn. J. Appl. Phys. **12**, 1644 (1973)
Hatano, J., Suda, F., Futama, H., J. Phys. Soc. Jpn. **41**, 188 (1976)
Hatano, J., Suda, F., Futama, H., J. Phys. Soc. Jpn. **43**, 1933 (1977)
Hatano, J., Suda, F., Futama, H., Ferroelectrics **20**, 265 (1978)
Hatano, J., Kume, N., Kubota, K., Tsukamoto, T., Futama, H., Gesi, K., Jpn. J. Appl. Phys. Suppl. **24–2**, 844 (1985a)
Hatano, J., Suda, F., Aikawa, F., Futama, H., Szczesniak, L., Hilczer, B., Ferroelectrics **63**, 69 (1985b)
Hatano, J., Le Bihan, R., Aikawa, F., Mbama, F., Ferroelectrics **106**, 33 (1990a)
Hatano, J., Rafii, N., Robert, M.-C., Le Bihan, R., Ferroelectrics **106**, 39 (1990b)

Hatano, J., Watanabe, T., Le Bihan, R., Ferroelectrics **126**, 311 (1992)
Haun, M.J., Furman, E., Jang, S.J., McKinstry, H.A., Cross, L.E., J. Appl. Phys. **62**, 3331 (1987)
Hayashi, M., Memoirs of the Faculty of Engineering, Nagoya University **24**, 216 (1972a)
Hayashi, M., J. Phys. Soc. Jpn. **33**, 616 (1972b)
Hayashi, M., J. Phys. Soc. Jpn. **34**, 1240 (1973)
Hayashi, M., Mishima, H., Jpn. J. Appl. Phys. **8**, 968 (1969)
Heimann, B., Principles of chemical etching – the art and science of etching crystals., in Crystals, vol. 8, edited by J. Grabmaier, Springer Verlag, Berlin (1982)
Heising, R.A., Quartz Crystals for Electrical Circuits. D. Van Nostrand, New York (1947)
Hetzler, U., Würfel, P., Ferroelectrics **20**, 275 (1978)
Hiboux, S., Ph.D. Thesis, Swiss Federal Institute of Technology (EPFL), (2001)
Hiboux, S., Muralt, P., Integr. Ferroelectr. **36**, 83 (2001)
Hiboux, S., Muralt, P., Maeder, T., J. Mater. Res. **14**, 4307 (1999)
Hidaka, T., Maruyama, T., Saitoh, M., Mikoshiba, N., Shimizu, M., Shiosaki, T., Wills, L.A., Hikes, R., Dicarolis, S.A., Amano, J., Appl. Phys. Lett. **68**, 2358 (1996)
Hidaka, T., Maruyama, T., Sakai, I., Saitoh, M., Wills, L.A., Hiskes, R., Dicarolis, S.A., Amano, J., Foster, C.M., Integr. Ferroelectr. **17**, 319 (1997)
Hilczer, B., Meyer, K.-P., Pawlaczyk, C., Szczesniak, L., Phys. Stat. Sol. (a) **28**, K101 (1975)
Hilczer, B., Pawlaczyk, C., Szczesniak, L., Meyer, K.-P., Scholz, R., Mater. Sci. **7**, 427 (1981)
Hilczer, B., Szczesniak, L., Meyer, K.-P., Ferroelectrics **97**, 59 (1989)
Hirano, T., Kawai, H., Suzuki, H., Kaneko, S., Wada, T., Ferroelectrics **231**, 211 (1999)
Hlinka, J., Ferroelectrics **375**, 132 (2008)
Hlinka, J., Marton, P., Phys. Rev. B **74**, 104104 (2006)
Holakovsky, J., Phys. Stat. Sol. (b) **56**, 615 (1973)
Holec, D., Zhang, Y., Rao, D.V.S., Kappers, M.J., McAleese, C., Humphreys, C.J., J. Appl. Phys. **104**, 123514 (2008)
Hong, S. (ed.): Nanoscale Phenomena in Ferroelectric Thin Films. Springer-Verlag, New York (2004)
Hong, S., Setter, N., Appl. Phys. Lett. **81**, 3437 (2002)
Hong, J.W., Kahng, D.S., Shin, J.C., Kim, H.J., Khim, Z.G., J. Vac. Sci. Technol. B **16**, 2942 (1998a)
Hong, J.W., Noh, K.H., Park, S., Phys. Rev. B **58**, 5078 (1998b)
Hong, J.W., Park, S.-I., Khim, Z.G., Rev. Sci. Instrum. **70**, 1735 (1999a)
Hong, S., Colla, E.L., Kim, E., Taylor, D.V., Tagantsev, A.K., Muralt, P., No, K., Setter, N., J. Appl. Phys. **86**, 607 (1999b)
Hooton, J.A., Merz, W.J., Phys. Rev. **98**, 409 (1955)
Hoshino, S., Mitsui, T., Jona, F., Pepinsky, R., Phys. Rev. **107**, 1255 (1957)
Houé, M., Townsend, P.D., J. Phys. D Appl. Phys. **28**, 1747 (1995)
Hsu, W.-Y., Raj, R., Appl. Phys. Lett. **67**, 3733 (1995)
Hu, Y.H., Chan, H.M., Wen, Z.X., Harmer, M.P., J. Am. Ceram. Soc. **69**, 594 (1986)
Hu, Z.W., Jiang, S.S., Huang, P.Q., Huang, X.R., Feng, D., Wang, J.Y., Li, L.X., Appl. Phys. Lett. **64**, 55 (1994)
Huang, X.R., Hu, Z.W., Jiang, S.S., Jiang, J.H., Tian, Y.L., Han, Y., Wang, J.Y., J. Appl. Phys. **75**, 7756 (1994a)
Huang, X.R., Jiang, S.S., Hu, Z.W., Xu, X.Y., Zeng, W., Jiang, J.H., Wang, J.Y., Feng, D., Phys. Rev. B **50**, 13149 (1994b)
Huang, X.R., Jiang, S.S., Hu, X.B., Xu, X.Y., Zeng, W., Feng, D., Wang, J.Y., Phys. Rev. B **52**, 9932 (1995)
Huang, Y.N., Li, X., Ding, Y., Wang, Y.N., Shen, H.M., Zhang, Z.F., Fang, C.S., Zhuo, S.H., Fung, P.C.W., Phys. Rev. B **55**, 16159 (1997)
Hubert, C., Levy, J., Appl. Phys. Lett. **73**, 3229 (1998)

Hubert, C., Levy, J., Carter, A.C., Chang, W., Kiechoefer, S.W., Horwitz, J.S., Chrisey, D.B., Appl. Phys. Lett. **71**, 3353 (1997)
Huibregtse, E.J., Young, D.R., Phys. Rev. **103**, 1705 (1956)
Husimi, K., J. Phys. Soc. Jpn. **15**, 731 (1960)
Igras, E., Kristallografiya **4**, 121 (1959)
Imry, Y., Ma, S., Phys. Rev. Lett. **35**, 1399 (1975)
Indenbom, V.L., Sov. Phys. Crystallogr. **5**, 106 (1960)
Indenbom, V.L., Bull. Acad. Sci. USSR **43**, 69 (1979)
Ishibashi, Y., Dvorak, V., J. Phys. Soc. Jpn. **41**, 1650 (1976)
Ishibashi, Y., Iwata, M., Jpn. J. Appl. Phys. **38**, 800 (1999)
Ishibashi, Y., Takagi, Y., J. Phys. Soc. Jpn. **31**, 506 (1971)
Ishigame, Y., Suhara, T., Nishihara, H., Opt. Lett. **16**, 375 (1991)
Ishihara, S., Ye, Z.G., Rabe, H., Rivera, J.-P., Kubel, F., Schmid, H., Ferroelectrics **140**, 53 (1993)
Ishizuka, K., Uyeda, N., Acta Cryst. A **33**, 740 (1977)
Ivanov, N.R., Tikhomirova, N.A., Ginzberg, A.V., Chumakova, S.P., Ferroelectr.s Lett. **15**, 127 (1993)
Ivanov, N.R., Tikhomirova, N.A., Ginzberg, A.V., Chumakova, S.P., Eknadiosyants, E.I., Borodin, V.Z., Pinskaya, A.N., Babanskikh, V.A., D'yakov, V.A., Crystallogr. Rep. **39**, 593 (1994)
Iwasaki, H., Miyazawa, S., Koizumi, H., Sugii, K., Niizeki, N., J. Appl. Cryst. **43**, 4907 (1972)
Jaffe, B., Cook Jr., W.R., Jaffe, H.: Piezoelectric Ceramics. Academic Press, London (1971)
Janovec, V., Czech. J. Phys. **8**, 3 (1958)
Janovec, V., Czech. J. Phys. **9**, 468 (1959)
Janovec, V., Czech. J. Phys. **B 22**, 974 (1972)
Janovec, V., Ferroelectrics **12**, 43 (1976)
Janovec, V., Brezina, B., Glanc, A., Czech. J. Phys. B **10**, 690 (1960)
Janovec, V., Dvorak, V., Petzelt, J., Czech. J. Phys. B **25**, 1362 (1975)
Janovec, V., Schranz, W., Warhanek, H., Zikmund, Z., Ferroelectrics **98**, 171 (1989)
Janovec, V., Richterová, L., Litvin, D.B., Ferroelectrics **140**, 95 (1993)
Janta, J., J. Phys. Soc. Jpn. **28 Suppl.**, 340 (1970)
Janta, J., Ferroelectrics **2**, 299 (1971)
Jaskiewicz, A., Przeslawski, J., Phys. Stat. Sol. (a) **56**, 365 (1979)
Jex, H., Müllner, M., Tietze, H., Lehner, N., Wilson, S., Phys. Rev. B **26**, 2539 (1982)
Jiang, S.S., Hu, Z.W., Yang, P., Feng, D., Ferroelectrics **140**, 71 (1993)
Jiang, B., Lee, J.C., Zurcher, P., Jones, J.R.E., Integr. Ferroelectr. **16**, 199 (1997)
Jiang, F., Kojima, S., Yang, Y., Yin, Q., Ferroelectrics **222**, 237 (1999)
Jo, W., Kim, D.C., Hong, J.W., Appl. Phys. Lett. **76**, 390 (2000)
Johnson, D.J., Amm, D.T., Griswold, E., Sreenivas, K., Yi, G., Sayer, M.: Measuring fatigue in PZT thin films, in Ferroelectric Thin Films, edited by Kingon, A.I., Myers, E.R. (Mater. Res. Soc. Symp. Proc. **Volume 200**, p. 289, Warrendale, PA, 1990)
Jona, F., Shirane, G., Ferroelectric Crystals. Pergamon Press, Oxford (1962)
Jona, F., Shirane, G., Pepinsky, R., Phys. Rev. **97**, 1584 (1955)
Jonscher, A.K., Universal Relaxation Law. Chelsea Dielectrics Press, London (1996)
Jun, C., Wang, W.-S., Qi, L., Duan, F., Cryst. Res. Technol. **23**, 747 (1988)
Kadlec, F., Petzelt, J., Zelezny, V., Volkov, A.A., Solid State Commun. **94**, 725 (1995)
Kahmann, F., Matull, R., Rupp, R.A., Seglins, J., Europhys. Lett. **13**, 405 (1990)
Kahmann, F., Matull, R., Rupp, R.A., Seglins, J., Phase Transitions **40**, 171 (1992)
Kahmann, F., Matull, R., Rupp, R.A., Seglins, J., Ferroelectrics **151**, 139 (1994)
Kaiser, D.L., Vaudin, M.D., Rotter, L.D., Wang, Z.L., Cline, J.P., Hwang, C.S., Marinenko, R.B., Gillen, J.G., Appl. Phys. Lett. **66**, 2801 (1995)
Kalinin, S.V., Bonnell, D.A., Phys. Rev. B **63**, 125411 (2001a)
Kalinin, S.V., Bonnell, D.A., Appl. Phys. Lett. **78**, 1116 (2001b)
Kalinin, S.V., Gruverman, A. (eds.): Scanning Probe Microscopy of Electrical and Electromechanical Phenomena at the Nanoscale. Springer, New York (2006)

Kalinin, S.V., Gruverman, A., Bonnell, D.A., Appl. Phys. Lett. **85**, 795 (2004)
Kalinin, S.V., Johnson, C.Y., Bonnell, D.A., J. Appl. Phys. **91**, 3816 (2002)
Kamentsev, V.P., Rudyak, V.M., Izvestiya Akad. Nauk SSSR, ser. fiz. **48**, 1204 (1984)
Kang, Y.M., Baik, S., J. Appl. Phys. **82**, 2532 (1997)
Kardar, M., J. Appl. Phys. **61**, 3601 (1987)
Karpov, A.I., Poplavko, Yu.M., Izvestiya Akad. Nauk SSSR, ser. fiz. **48**, 1193 (1984)
Kawata, H., Suzuki, S., Takagi, M., J. Phys. Soc. Jpn. **50**, 3398 (1981)
Kay, H.F., Dunn, J.W., Philos. Mag.**7**, 2027 (1962)
Kholkin, A.L., Brooks, K.G., Taylor, D.V., Hiboux, S., Setter, N., Integr. Ferroelectr. **22**, 525 (1998)
Kholodenko, L.P., Sov. Phys. Solid State **3**, 2284 (1962)
Kinase, W., Takahasi, H., J. Phys. Soc. Jpn. **12**, 464 (1957)
Kinase, W., Okayama, H., Yoshikawa, A., Taguchi, N., J. Phys. Soc. Jpn. **28, Suppl.**, 383 (1970)
Kirpichnikova, L.F., Shuvalov, L.A., Urusovskaya, A.A., Ivanov, N.R., Kiosse, G.A., Ferroelectrics **140**, 1 (1993)
Kirpichnikova, L.F., Urusovskaya, A.A., Dolbinina, V.V., Ferroelectrics **172**, 133 (1995)
Kitamura, K., Furukawa, Y., Niwa, K., Gopalan, V., Mitchell, T.E., Appl. Phys. Lett. **73**, 3073 (1998)
Kittel, C., Phys. Rev. **82**, 729 (1951)
Kittel, C., Solid State Commun. **10**, 119 (1972)
Klapper, H., Prog. Cryst. Growth Charact. **14**, 367 (1987)
Klassen-Neklyudova, M.V., Mechanical Twinning of Crystals. Consultants Bureau, New York (1964)
Kleemann, W., Dec, J., Prosandeev, S.A., Braun, T., Thomas, P.A., Ferroelectrics **334**, 3 (2006)
Klissurska, R., Tagantsev, A.K., Brooks, K.G., Setter, N., J. Am. Ceram. Soc. **80**, 336 (1997)
Kliya, M.O., Lyachovitskaya, V.A., J. Phys. Soc. Jpn. Suppl. **28**, 217 (1970a)
Kliya, M.O., Lyakhovitskaya, V.A., Sov. Phys. Crystallogr. **15**, 59 (1970b)
Kobayashi, J., Phys. Stat. Sol. **21**, 151 (1967)
Kobayashi, J., Phase Transitions **36**, 95 (1991)
Kobayashi, J., Yamada, N., Nakamura, T., Phys. Rev. Lett. **11**, 410 (1963)
Kobayashi, J., Someya, T., Furuhata, Y., Phys. Lett. A **38**, 309 (1972)
Kobzareva, S.A., Distler, G.I., Konstantinova, V.P., Sov. Phys. Crystallogr. **15**, 431 (1970)
Kogan, S.M., Sov. Phys. Solid State **5**, 2069 (1963)
Kojima, S., Jpn. J. Appl. Phys. Suppl. **23–1**, 203 (1983)
Kojima, S., Ferroelectrics **93**, 279 (1989)
Kokhanchik, L.S., Izvestiya Akad. Nauk SSSR, ser. fiz. **57**, 62 (1993)
Kolmogorov, A.N., Izv. Acad. Nauk; Ser. Math. **3**, 355 (1937)
Kolomeisky, E.B., Levanyuk, A.P., Sigov, A.S., Ferroelectrics **104**, 195 (1990)
Komukae, M., Tanaka, M., Osaka, T., Makita, Y., Kozawa, K., Uchida, T., J. Phys. Soc. Jpn. **59**, 197 (1990)
Konstantinova, V.P., Kristallografiya **7**, 748 (1962)
Konstantinova, V.P., Stankovskaya, Ya., Sov. Phys. Crystallogr. **15**, 325 (1970)
Konstantinova, V.P., Stankowska, I., Sov. Phys. Crystallogr. **16**, 123 (1971)
Konstantinova, V.P., Tikhomirova, N.A., Glogarová, M., Ferroelectrics **20**, 259 (1978)
Kopal, A., Bahnik, T., Fousek, J., Ferroelectrics **202**, 267 (1997)
Kopal, A., Mokry, P., Fousek, J., Bahnik, T., Ferroelectrics **223**, 127 (1999)
Koptsik, V.A., Toshev, S.D., Izvestiya Akad. Nauk SSSR, ser. fiz. **29**, 956 (1965)
Koralewski, M., Szafranski, M., Ferroelectrics **97**, 233 (1989)
Koukhar, V.G., Pertsev, N.A., Waser, R., Phys. Rev. B **64**, 214103 (2001)
Koukhar, V.G., Pertsev, N.A., Kohlstedt, H., Waser, R., Phys. Rev. B **73**, 214103 (2006)
Kovalevich, V.I., Shuvalov, L.A., Volk, T.R., Phys. Stat. Sol. (a) **45**, 249 (1978)
Krainyuk, G.G., Nosenko, A.E., Otko, A.I., Ferroelectrics **48**, 175 (1983a)

Krainyuk, G.G., Otko, A.I., Nosenko, A.E., Izvestiya Akad. Nauk SSSR, ser. fiz. **47**, 758 (1983b)
Krainyuk, G.G., Otko, A.I., Nosenko, A.E., Bull. Acad. Sci. USSR **47**, 132 (1983c)
Krajewski, T., Jaroszyk, F., Acta Phys. Polon. A **43**, 845 (1973)
Kretschmer, R., Binder, K., Phys. Rev. B **20**, 1065 (1979)
Kronmüller, H., Z. Angew. Physik **30**, 9 (1970)
Kroupa, J., Fousek, J., Fousková, A., Petzelt, J., Pavel, M., Kamba, S., Fuith, A., Warhanek, H., Ferroelectrics **87**, 121 (1988)
Krug, R., Würfel, P., Ruppel, W., Ferroelectrics **139**, 17 (1993a)
Krug, R., Würfel, P., Ruppel, W., Appl. Opt. **32**, 6458 (1993b)
Kubel, F., Schmid, H., Ferroelectrics **129**, 101 (1992)
Kudryash, V.I., Prasolov, B.N., Fedosyuk, R.M., Izvestiya Akad. Nauk SSSR, ser. fiz. **53**, 1410 (1989)
Kudzin, A.Yu., Guskina, L.G., Petrushkevich, I.S., Fizika tverdogo tela **6**, 92 (1964)
Kugel, V.D., Rosenman, G., Appl. Phys. Lett. **68**, 2813 (1996)
Kugel, V.D., Rosenman, G., Shur, D., J. Phys. D Appl. Phys. **28**, 2360 (1995)
Kukushkin, S.A., Osipov, A.V., Phys. Rev. B **65**, 174101 (2002)
Kulcsar, F., J. Am. Ceram. Soc. **39**, 13 (1956)
Kumada, A., Phys. Lett. **30A**, 186 (1969)
Kumada, A., J. Jpn. Soc. Appl. Phys. Suppl. **39**, 258 (1970)
Kumada, A., Yumoto, H., Ashida, S., J. Phys. Soc. Jpn. Suppl. **28**, 351 (1970)
Kuramoto, K., J. Phys. Soc. Jpn. **56**, 1859 (1987)
Kuroda, A., Kurimura, S., Uesu, Y., Appl. Phys. Lett. **69**, 1565 (1996)
Kvitek, Z., Bornarel, J., Ferroelectrics **172**, 271 (1995)
Kvitek, Z., Bornarel, J., Ferroelectrics **190**, 31 (1997)
Kwak, B.S., Erbil, A., Wilkens, B.J., Budai, J.D., Chisholm, M.F., Boatner, L.A., Phys. Rev. Lett. **68**, 3733 (1992)
Kwak, B.S., Erbil, A., Budai, J.D., Chisholm, M.F., Boatner, L.A., Wilkens, B.J., Phys. Rev. B **49**, 14865 (1994)
Laikhtman, B.D., Sov. Phys. Solid State **15**, 62 (1973)
Laikhtman, B.D., Petrov, V.Yu., Sov. Phys. JETF **46**, 628 (1977a)
Laikhtman, B.D., Petrov, V.Yu., Fizika tverdogo tela **19**, 1512 (1977b)
Laikhtman, B.D., Tagantsev, A.K., Sov. Phys. Solid State **17**, 1127 (1975)
Lajzerowicz, J., Ferroelectrics **24**, 179 (1980)
Lajzerowicz, J., Ferroelectrics **35**, 219 (1981)
Lajzerowicz, J., Niez, J.J., J. Phys. Lett. Paris **40**, L–165 (1979)
Landauer, R., J. Appl. Phys. **28**, 227 (1957)
Landauer, R., Young, D.R., Drougard, M.E., J. Appl. Phys. **27**, 752 (1956)
Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology, New Series vol. III/3. Springer, New York (1969)
Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology, New Series vol. III/9. Springer, New York (1975)
Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology, New Series vol. III/16a. Springer, New York (1981)
Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology, New Series vol. III/16b. Springer, New York (1982)
Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology, New Series vol. III/28b. Springer, New York (1990a)
Landolt-Börnstein, Numerical Data and Functional Relationships in Science and Technology, New Series vol. III/28a. Springer, New York (1990b)
Lang, A.R., Appl. Phys. Lett. **7**, 168 (1965)
Larkin, A.I., Ovchinnikov, Y.N., J. Low Temp. Phys. **34**, 409 (1979)

Larsen, P.K., Kampschoer, G.L.M., Ulenaers, M.J.E., Spierings, A.C.M., Cuppens, R., Appl. Phys. Lett. **59**, 611 (1991)

Larsen, P.K., Dormans, G.J.M., Taylor, D.J., Van Veldhoven, P.J., J. Appl. Phys. **76**, 2405 (1994)

Latham, R.V., Br. J. Appl. Phys. **18**, 1383 (1967)

Laughner, J.W., Newnham, R.E., Cross, L.E., Phys. Stat. Sol. (a) **56**, K83 (1979)

Laughner, J.W., Wadhawan, V.K., Newnham, R.E., Ferroelectrics **36**, 439 (1981)

Laurell, F., Roelofs, M.G., Bindloss, W., Hsiung, H., Suna, A., Bierlein, J.D., J. Appl. Phys. **71**, 4664 (1992)

Lawless, W.N., Phys. Rev. **175**, 619 (1968)

Lawless, W.N., Ferroelectrics **73**, 395 (1987)

Lawless, W.N., Fousek, J., J. Phys. Soc. Jpn. **28**, 419 (1970)

Le Bihan, R., Ferroelectrics **97**, 19 (1989)

Le Bihan, R., Ferroelectrics **111**, (1990)

Le Bihan, R., Abboud, B., Ferroelectrics **92**, 375 (1989)

Le Bihan, R., Chartier, J.L., Proceedings of the. Seventh International Vaccum Congress and Third International Conference on Solid Surfaces, Vienna 1977, 2647 (1977)

Le Bihan, R., Maussion, M., C. R. Acad. Sci. Paris **272B**, 1010 (1971)

Le Bihan, R., Maussion, M., Ferroelectrics **7**, 307 (1974)

Le Bihan, R., Sella, C., J. Phys. Soc. Jpn. **28 Suppl**., 377 (1970)

Le Bihan, R., Chartier, J.L., Jean, L., Ferroelectrics **17**, 429 (1977)

Le Bihan, R., Maussion, M., Marbeuf, Ph., Ferroelectrics **22**, 827 (1978)

Le Bihan, R., Boudjema, E.H., Hilczer, B., Szczesniak, L., Mayer, C.-P., Ferroelectrics **55**, 189 (1984)

Le Bihan, R., Averty, D., Pain, D., Ferroelectrics **172**, 181 (1995)

Lebedev, N.I., Sigov, A.S., Integr. Ferroelectr. **4**, 21 (1994)

Lee, K.S., Baik, S., J. Appl. Phys. **85**, 1995 (1999)

Lee, K.S., Baik, S., J. Appl. Phys. **87**, 8035 (2000)

Lee, J.-H., Nakamura, T., Takashige, M., Jpn. J. Appl. Phys. **23**, 378 (1984)

Lee, J., Ramesh, R., Keramidas, V.G., Warren, W.L., Pike, G.E., Evans, J.T., Appl. Phys. Lett. **66**, 1337 (1995a)

Lee, J.J., Thio, C.L., Desu, S.B., J. Appl. Phys. **78**, 5073 (1995b)

Lee, E.G., Wouters, D.J., Willems, G., Maes, H.E., Appl. Phys. Lett. **70**, 2404 (1997a)

Lee, K.S., Kang, Y.M., Baik, S., Integr. Ferroelectr. **14**, 43 (1997b)

Lee, K., Lee, K.S., Baik, S., J. Appl. Phys. **90**, 6327 (2001a)

Lee, K.S., Choi, J.H., Lee, J.Y., Baik, S., J. Appl. Phys. **90**, 4095 (2001b)

Lee, W.T., Salje, E.K.H., Bismayer, U., J. Phys. Condens. Matter **14**, 7901 (2002)

Lee, W.T., Salje, E.K.H., Bismayer, U., J. Appl. Phys. **93**, 9890 (2003)

Lehnen, P., Dec, J., Kleemann, W., J. Phys. D Appl. Phys. **33**, 1932 (2000)

Lejcek, L., Czech. J. Phys. B **33**, 447 (1983)

Levanyuk, A.P., Sigov, A.S., Defects and Structural Phase Transitions. Gordon and Breach, New York (1988)

Levanyuk, A.P., Sannikov, D.G., Zh. Eksp. Teor. Fiz. **55**, 256 (1968)

Levy, J., Hubert, C., Trivelli, A., J. Chem. Phys. **112**, 7848 (2000)

Li, Z., Foster, C.M., Dai, X.-H., Xu, X.-Z., Chan, S.-K., Lam, D.J., J. Appl. Phys. **71**, 4481 (1992)

Li, Y.L., Hu, S.Y., Liu, Z.K., Chen, L.Q., Appl. Phys. Lett. **78**, 3878 (2001)

Li, Y.L., Hu, S.Y., Liu, Z.K., Chen, L.Q., Acta Mater. **50**, 395 (2002)

Li, Y.L., Choudhury, S., Liu, Z.K., Chen, L.Q., Appl. Phys. Lett. **83**, 1608 (2003)

Li, Y.L., Cross, L.E., Chen, L.Q., J. Appl. Phys. **98**, 64101 (2005)

Lian, L., Chong, T.C., Kumagai, H., Hirano, M., Taijing, L., Ng, S.C., J. Appl. Phys. **80**, 376 (1996)

Liao, J., Yang, Y., Hui, S.X., Luo, H.S., Yin, Q.R., Ferroelectrics **231**, 55 (1999a)

Liao, J., Yang, Y., Jiang, X.P., Hui, S.X., Yin, Q.R., Mater. Lett. **39**, 335 (1999b)

Lim, A.R., Jeong, S.-Y., Solid State Commun. **110**, 131 (1999)

Lim, A.R., Choh, S.H., Jang, M.S., J. Phys. Condens. Matter **1**, 1571 (1989)

Lim, A.R., Choh, S.H., Jang, M.S., J. Phys. Condens. Matter **7**, 7309 (1995)

Lin, C.H., Yen, B.M., Batzer, R.S., Chen, H., Ferroelectrics **221**, 237 (1999)

Lin, P.J., Bursill, L.A., Phil. Mag. A **48**, 251 (1983)

Lines, M.E., Glass, A.M., Principles and Applications of Ferroelectrics and Related Materials. Clarendon Press, Oxford (1977)

Little, E.A., Phys. Rev. **98**, 978 (1955)

Litvin, D.B., Janovec, V., Ferroelectrics **191**, 9 (1997)

Loge, R.E., Suo, Z., Acta Mater. **44**, 3429 (1996)

Lohse, O., Grossmann, M., Boettger, U., Bolten, D., Waser, R., J. Appl. Phys. **89**, 2332 (2001)

Lopez Rodriguez, V., Gonzales Ibeas, J., Ferroelectrics **6**, 203 (1973)

Love, E.A.H., A Treatise on the Mathematical Theory of Elasticity. Dover, New York (1944)

Lu, Y., Wei, T., Duewer, F., Lu, Y., Ming, N., Schultz, P.G., Xiang, X.-D., Science **276**, 2004 (1997)

Luh, Y.S., Feigelson, R.S., Fejer, M.M., Byer, R.L., J. Cryst. Growth **78**, 135 (1986)

Lundstrom, K.I., Svensson, C.M., IEEE Trans. Electron Devices **ED 19**, 826 (1972)

Luo, E.Z., Xie, Z., Xu, J.B., Wilson, I.H., Zhao, L.H., Phys. Rev. B **61**, 203 (2000)

Lüthi, R., Haefke, H., Grütter, P., Güntherodt, H.-J., Surf. Sci. Lett. **285**, L498 (1993a)

Lüthi, R., Haefke, H., Meyer, K.-P., Meyer, E., Howald, L., Güntherodt, H.-J., J. Appl. Phys. **74**, 7461 (1993b)

Lüthi, R., Haefke, H., Gutmannsbauer, W., Meyer, E., Howald, L., Güntherodt, H.-J., J. Vac. Sci. Technol. B **12**, 2451 (1994a)

Lüthi, R., Meyer, E., Howald, L., Haefke, H., Anselmetti, D., Dreier, M., Ruetschi, M., Bonner, T., Overney, R.M., Frommer, J., Güntherodt, H.-J., J. Vac. Sci. Technol. **12**, 1673 (1994b)

Lyuksyutov, I.F., Nattermann, T., Pokrovsky, V., Phys. Rev. B **59**, 4260 (1999)

Ma, W., Cross, L.E., Appl. Phys. Lett. **79**, 4420 (2001)

Maffit, K.N., J. Appl. Phys. **39**, 3878 (1968)

Magataev, V.K., Gladkii, V.V., Zheludev, I.S., Izvestija AN SSSR, ser. fiz. **39**, 778 (1975)

Maier, I.O., Sokolov, A.I., Tagantsev, A.K., Sov. Phys. Solid State **22**, 892 (1980)

Majumder, S.B., Mohapatra, Y.N., Agrawal, D.C., Appl. Phys. Lett. **70**, 138 (1997)

Makio, S., Nitanda, F., Ito, K., Sato, M., Appl. Phys. Lett. **61**, 3077 (1992)

Malek, Z., Mastner, J., Hrdlicka, J., Janta, J., Solid State Electron. **7**, 655 (1964)

Manolikas, C., Amelinckx, S., Phys. Stat. Sol. (a) **60**, 167 (1980a)

Manolikas, C., Amelinckx, S., Phys. Stat. Sol. (a) **60**, 607 (1980b)

Marchenko, V.I., Zh. Eksp. Teor. Fiz. **77**, 2419 (1979)

Martin, Y., Williams, C.C., Wickramasinghe, H.K., J. Appl. Phys. **61**, 4723 (1987)

Martin, Y., Abraham, D.W., Wickramasinghe, H.K., Appl. Phys. Lett. **52**, 1103 (1988)

Martinez, J.L., Gonzalo, J.A., Ferroelectrics **44**, 5 (1982)

Maruyama, T., Saitoh, M., Sakai, I., Hikada, T., Yano, Y., Noguchi, T., Appl. Phys. Lett. **73**, 3524 (1998)

Marvan, M., Czech. J. Phys. B **19**, 482 (1969)

Matthews, J.W., Blakeslee, A.E., J. Cryst. Growth **27**, 118 (1974)

Matthias, B., von Hippel, A., Phys. Rev. **73**, 1378 (1948)

Matyjasek, K., Jakubas, R., Ferroelectrics **190**, 25 (1997)

Mauguin, C., Bull. Soc. Fr. Minér. **34**, 71 (1911)

Maussion, M., Le Bihan, R., Ferroelectrics **13**, 465 (1976)

Maussion, M., Polomska, M., Le Bihan, R., Ferroelectr. Lett. **6**, 41 (1986)

Mayergoyz, I.D., Mathematical Models of Hysteresis. Springer Verlag, New York, Berlin (1991)

McLaren, A.C., Phakey, P.P., Phys. Stat. Sol. **31**, 723 (1969)

Meeks, S.W., Auld, B.A., Appl. Phys. Lett. **47**, 102 (1985)

Megaw, H.D.: Ferroelectricity in Crystals. Methuen, London (1957)
Meleshina, V.A., Kristallografiya **9**, 381 (1964)
Meleshina, V.A., J. Phys. Soc. Jpn. Suppl. **28**, 357 (1970)
Meleshina, V.A., Sov. Phys. Crystallogr. **16**, 471 (1971)
Meleshina, V.A., Indenbom, V.L., Bagdasarov, Kh.S., Pelkhovskaya, T.M., Sov. Phys. Crystallogr. **18**, 764 (1974)
Merz, W.J., Phys. Rev. **88**, 421 (1952)
Merz, W.J., Phys. Rev. **91**, 513 (1953)
Merz, W.J., Phys. Rev. **95**, 690 (1954)
Merz, W.J., J. Appl. Phys. **27**, 938 (1956)
Metrat, G., Ferroelectrics **26**, 801 (1980)
Meyer, K.-P., Veröffentlichungen 12. Tagung Elektronenmikroskopie, Dresden 1988, 491 (1988)
Meyer, B., Vanderbilt, D., Phys. Rev. B **65**, 104111 (2002)
Meyerhofer, D., Phys. Rev. **112**, 413 (1958)
Miga, S., Dec, J., Pawelczyk, M., J. Phys. Condens. Matter **8**, 8413 (1996)
Mihara, T., Watanabe, H., Araujo, C.A.P.d., Jpn. J. Appl. Phys. **33**, 3996 (1994)
Miller, R.C., Phys. Rev. **111**, 736 (1958)
Miller, R.C., Savage, A., Phys. Rev. **112**, 755 (1958)
Miller, R.C., Savage, A., Phys. Rev. Lett. **2**, 294 (1959a)
Miller, R.C., Savage, A., Phys. Rev. **115**, 1176 (1959b)
Miller, R.C., Savage, A., J. Appl. Phys. **31**, 662 (1959c)
Miller, R.C., Savage, A., J. Appl. Phys. **32**, 714 (1961)
Miller, R.C., Weinreich, G., Phys. Rev. **117**, 1460 (1960)
Miller, S.L., Nasby, R.D., Schwank, J.R., Rodgers, M.S., Dressendorfer, P.V., J. Appl. Phys. **68**, 6463 (1990)
Ming, N.-B., Hong, J.-F., Feng, D., J. Mater. Sci. **17**, 1663 (1982)
Mitsui, T., Furuichi, J., Phys. Rev. **90**, 193 (1953)
Mitsui, T., Furuichi, J., Phys. Rev. **95**, 558 (1954)
Mochizuki, J., Futama, H., J. Phys. Soc. Jpn. **23**, 127 (1967)
Mohler, E., Pitka, R., Solid State Commun. **14**, 791 (1974)
Mokry, P., Tagantsev, A.K., Setter, N., Phys. Rev. B **70**, 172107 (2004)
Mokry, P., Tagantsev, A.K., Fousek, J., Phys. Rev. B **75**, 094110 (2007)
Molotskii, M., Philos. Mag.Lett. **83**, 763 (2003a)
Molotskii, M., J. Appl. Phys. **93**, 6234 (2003b)
Molotskii, M., Kris, R., Rosenman, G., J. Appl. Phys. **88**, 5318 (2000)
Molotskii, M., Agronin, A., Urenski, P., Shvebelman, M., Rosenman, G., Rosenwaks, Y., Phys. Rev. Lett. **90**, 107601 (2003)
Moon, E.Y., Choh, S.H., Park, Y.H., Yeom, H.Y., Jang, M.S., J. Phys. C Solid State Phys. **20**, 1867 (1987)
Moravec, F., Konstantinova, V.P., Kristallografiya **13**, 284 (1968)
Mulvihill, M.L., Cross, L.E., Cao, W., Uchino, K., J. Am. Ceram. Soc. **80**, 1462 (1997)
Munoz Saldana, J., Schneider, G.A., Eng, L.M., Surf. Sci. **480**, L402 (2001)
Müller, K.A., Berlinger, W., Solid State Commun. **8**, 549 (1970)
Müser, H.E., Kuhn, W., Albers, J., Phys. Stat. Sol. (a) **49**, 51 (1978)
Nagarajan, V., Jenkins, I.G., Alpay, S.P., Li, H., Aggarwal, S., Salamanca-Riba, L., Ramesh, R., J. Appl. Phys. **86**, 595 (1999)
Nagarajan, V., Ganpule, C.S., Li, H., Salamanca-Riba, L., Roytburd, A.L., Williams, E.D., Ramesh, R., Appl. Phys. Lett. **79**, 2805 (2001)
Nagarajan, V., Roytburd, A., Stanishevsky, A., Prasertchoung, S., Zhao, T., Chen, L., Melngailis, J., Auciello, O., Ramesh, R., Nat. Mater. **2**, 43 (2003)
Nakamura, T., J. Phys. Soc. Jpn. **8**, 1379 (1960)
Nakamura, K., Jpn. J. Appl. Phys. **31 Suppl. 31–1**, 9 (1991)
Nakamura, T., Nakamura, H., Jpn. J. Appl. Phys. **1**, 253 (1962)

Nakamura, K., Tourlog, A., Appl. Phys. Lett. **63**, 2065 (1993)
Nakamura, T., Ogihara, H., Kobayashi, J., J. Phys. Soc. Jpn. **18**, 1716 (1963)
Nakamura, E., Sato, H., Motegi, H., J. Phys. Soc. Jpn. **47**, 1567 (1979)
Nakamura, E., Ushio, S., Abe, K., J. Phys. Soc. Jpn. **53**, 403 (1984)
Nakamura, E., Kuramoto, K., Deguchi, K., Hayashi, K., Ferroelectrics **98**, 51 (1989)
Nakatani, N., J. Phys. Soc. Jpn. **32**, 1556 (1972)
Nakatani, N., Jpn. J. Appl. Phys. **12**, 1723 (1973)
Nakatani, N., J. Phys. Soc. Jpn. **39**, 741 (1975)
Nakatani, N., Jpn. J. Appl. Phys. **18**, 491 (1979)
Nakatani, N., Jpn. J. Appl. Phys. **24**, L528 (1985)
Nakatani, N., Ferroelectrics **97**, 127 (1989a)
Nakatani, N., Jpn. J. Appl. Phys. **28 Suppl. 28–2**, 143 (1989b)
Nakatani, N., Jpn. J. Appl. Phys. **30**, 1024 (1991a)
Nakatani, N., Jpn. J. Appl. Phys. **30**, 3445 (1991b)
Nakatani, N., Hirota, M., Jpn. J. Appl. Phys. **20**, 2281 (1981)
Nanamatsu, S., Kimura, M., Doi, K., Matsushita, S., Yamada, N., Ferroelectrics **8**, 511 (1974)
Nassau, K., Levinstein, H.J., Loiacono, G.M., Appl. Phys. Lett. **6**, 228 (1965)
Nattermann, T., J. Phys. C Solid State Phys. **16**, 4125 (1983)
Nattermann, T., Shapir, Y., Vilfan, I., Phys. Rev. B **42**, 8577 (1990)
Nattermann, T., Pokrovsky, V., Vinokur, V.M., Phys. Rev. Lett. **87**, 197005 (2001)
Nechaev, V.N., Roshchupkin, A.M., Fizika tverdogo tela **30**, 2286 (1988)
Nechaev, V.N., Roshchupkin, A.M., Fizika tverdogo tela **31**, 243 (1989)
Nettleton, R.E., J. Appl. Phys. **38**, 2775 (1967)
Newnham, R.E., Cross, L.E., Mater. Res. Bull. **9**, 927 (1974a)
Newnham, R.E., Cross, L.E., Mater. Res. Bull. **9**, 1021 (1974b)
Newton, R.R., Ahearn, A.J., McKay, K.G., Phys. Rev. **75**, 103 (1949)
Néel, L., Cah. Phys. **12**, 1 (1942)
Niizeki, N., Hasegawa, M., J. Phys. Soc. Jpn. **19**, 550 (1964)
Niizeki, N., Yamada, T., Toyoda, H., Jpn. J. Appl. Phys. **6**, 318 (1967)
Nomura, S., Asao, Y., Sawada, S., J. Phys. Soc. Jpn. **16**, 917 (1961)
Nonnenmacher, M., O'Boyle, M.P., Wickramasinghe, H.K., Appl. Phys. Lett. **58**, 2921 (1991)
Novák, M., Hrdlicka, J., Czech. J. Phys. B **18**, 122 (1968)
Novak, J., Salje, E.K.H., J. Phys. Condens. Matter **10**, L359 (1998)
Nutt, A.C.G., Gopalan, V., Gupta, M.C., Appl. Phys. Lett. **60**, 2828 (1992)
Nye, J.F., Physical Properties of Crystals. Clarendon Press, Oxford (1992)
O'Dwyer, J.J., The Theory of Electrical Conduction and Breakdown in Solid Dielectrics. Clarendon Press, Oxford (1973)
O'Keefe, M.A., Hetherington, C.J.D., Wang, Y.C., Nelson, E.C., Turner, J.H., Kisielowski, E.C., Malm, J.-O., Mueller, R., Ringnalda, J., Pan, M., Thust, A., Ultramicroscopy **89**, 215 (2001)
Odagawa, H., Cho, Y., Ferroelectrics **251**, 29 (2001)
Odagawa, H., Cho, Y., Appl. Phys. Lett. **80**, 2159 (2002)
Ogawa, T., Senda, A., Kasanami, T., Jpn. J. Appl. Phys. **30**, 2145 (1991)
Oh, K.-Y., Uchino, K., Cross, L.E., J. Am. Ceram. Soc. **77**, 2809 (1994)
Ohgami, J., Sugawara, Y., Morita, S., Nakamura, E., Ozaki, T., Jpn. J. Appl. Phys. **35**, 2734 (1996)
Ohtomo, A., Hwang, H.Y., Nature **427**, 423 (2004)
Okada, K., Suzuki, I., Sugie, H., J. Phys. Soc. Jpn. Suppl. **49**, 178 (1980)
Oleinik, A.S., Bokov, V.A., Sov. Phys. Solid State **17**, 560 (1975)
Orihara, H., Hashimoto, S., Ishibashi, Y., J. Phys. Soc. Jpn. **63**, 1031 (1994)
Orlik, X.K., Labardi, M., Allegrini, M., Appl. Phys. Lett. **77**, 2042 (2000)
Otko, A.I., Stasyuk, I.V., Ferroelectrics **172**, 207 (1995)

Otko, A.I., Nesterenko, N.M., Krainyuk, G.G., Nosenko, A.E., Ferroelectrics **48**, 143 (1983)
Otko, A.I., Nosenko, A.E., Sol'skii, I.M., Burak, Y.V., Fizika tverdogo tela **31**, 42 (1989)
Otko, A.I., Nosenko, A.E., Volk, T.R., Shuvalov, L.A., Ferroelectrics **145**, 163 (1993a)
Otko, A.I., Zapart, W., Zapart, M.B., Kapustianik, V.B., Kusznir, O., Ferroelectrics **141**, 43 (1993b)
Otko, A.I., Nosenko, A.E., Gumennyi, R.M., Stasyuk, I.V., Solskii, I.M., Ferroelectrics **191**, 159 (1997)
Otto, T., Grafström, S., Chaib, H., Eng, L.M., Appl. Phys. Lett. **84**, 1168 (2004)
Ozaki, T., Ferroelectrics **172**, 65 (1995)
Ozaki, T., Fuji, K., Aoyagi, S., J. Appl. Phys. **80**, 1697 (1996)
Ozaki, T., Ohgami, J., J. Phys. Condens. Matter **7**, 1711 (1995)
Ozaki, T., Senju, T., Nakamura, E., J. Phys. Soc. Jpn. **62**, 3027 (1993)
Ozaki, T., Kitamura, T., Ohgami, J., Nakamura, E., Ferroelectrics **157**, 87 (1994)
Ozaki, T., Amau, T., Kawata, H., Mizung, K., Mori, K., J. Phys. Soc. Jpn. **66**, 479 (1997)
Padilla, J., Zhong, W., Vanderbilt, D., Phys. Rev. B **53**, R5969 (1996)
Pakulski, G., Breczewski, T., Mroz, B., Krajewski, T., Ferroelectrics **74**, 375 (1987)
Pakulski, G., Mroz, B., Krajewski, T., Ferroelectrics **48**, 259 (1983)
Pan, W., Zhang, Q., Bhalla, A.S., Cross, L.E., J. Am. Ceram. Soc. **71**, C–302 (1988)
Park, Y., Solid State Commun. **113**, 379 (2000)
Park, B.M., Chung, S.J., J. Am. Ceram. Soc. **77**, 3193 (1994)
Park, B.M., Park, H.M., Chung, S.J., J. Korean Phys. Soc. (Proc. Suppl.) **32**, S752 (1998)
Parpia, D.Y., Philos. Mag.A **46**, 691 (1982a)
Parpia, D.Y., Philos. Mag.A **45**, 593 (1982b)
Paruch, P., Giamarchi, T., Triscone, J.M., Phys. Rev. Lett. **94**, 197601 (2005)
Paruch, P., Giamarchi, T., Tybell, T., Triscone, J.-M., J. Appl. Phys. **100**, 051608 (2006)
Pastrnak, J., Cross, L.E., Phys. Stat. Sol. (b) **44**, 313 (1971)
Paton, E., Brazier, M., Mansour, S., Bement, A., Integr. Ferroelectr. **18**, 29 (1997)
Pawlaczyk, C., Tagantsev, A.K., Brooks, K., Reaney, I.M., Klissurska, R., Setter, N., Integr. Ferroelectr. **8**, 293 (1995)
Payne, M.C., Teter, M.P., Allan, D.C., Arias, T.A., Joannopoulos, J.D., Rev. Mod. Phys. **64**, 1045 (1992)
Pearson, G.L., Feldmann, W.L., Phys. Chem. Solids **9**, 28 (1959)
Peercy, P.S., Samara, G.A., Phys. Rev. B **8**, 2033 (1973)
Pendergrass, L.L., J. Appl. Phys. **62**, 231 (1987)
Peng, J.-L., Bursill, L.A., Philos. Mag.A **45**, 911 (1982)
People, R., Bean, J.C., Appl. Phys. Lett. **47**, 322 (1985)
Perez, R., Toribio, E., Gorri, J.A., Benadero, L., Ferroelectrics **74**, 3 (1987)
Petroff, J.F., Phys. Stat. Sol. **31**, 285 (1969)
Pertsev, N.A., Arlt, G., J. Appl. Phys. **74**, 4105 (1993)
Pertsev, N.A., Kohlstedt, H., Phys. Rev. Lett. **98**, 257603 (2007)
Pertsev, N.A., Kohlstedt, H., Phys. Rev. Lett. **100**, 149702 (2008)
Pertsev, N.A., Koukhar, V.G., Phys. Rev. Lett. **84**, 3722 (2000)
Pertsev, N.A., Zembilgotov, A.G., J. Appl. Phys. **78**, 6170 (1995)
Pertsev, N.A., Arlt, G., Zembilgotov, A.G., Phys. Rev. Lett. **76**, 1364 (1996)
Pertsev, N.A., Zembilgotov, A.G., Tagantsev, A.K., Phys. Rev. Lett. **80**, 1988 (1998)
Pertsev, N.A., Zembilgotov, A.G., Hoffmann, S., Waser, R., Tagantsev, A.K., J. Appl. Phys. **85**, 1698 (1999a)
Pertsev, N.A., Zembilgotov, A.G., Tagantsev, A.K., Ferroelectrics **223**, 79 (1999b)
Pertsev, N.A., Tagantsev, A.K., Setter, N., Phys. Rev. B **61**, R825 (2000)
Pertsev, N.A., Tagantsev, A.K., Setter, N., Phys. Rev. B **65**, 219901 (2002)
Pertsev, N.A., Contreras, J.R., Kukhar, V.G., Hermanns, B., Kohlstedt, H., Waser, R., Appl. Phys. Lett. **83**, 3356 (2003a)

Pertsev, N.A., Koukhar, V.G., Kohlstedt, H., Waser, R., Phys. Rev. B **67**, 054107 (2003b)
Petzelt, J., Grigas, J., Mayerova, I., Ferroelectrics **6**, 225 (1974)
Peuzin, J.C., Tasson, M., Phys. Stat. Sol. (a) **37**, 119 (1976)
Pike, G.E., Warren, W.L., Dimos, D., Tuttle, B.A., Ramesh, R., Lee, J., Keramidas, V.G., Evans, J.T., Appl. Phys. Lett. **66**, 484 (1995)
Pique, J.P., Dolino, G., Vallade, M., J. Phys. Paris **38**, 1527 (1977)
Polcarová, M., Brádler, J., Janta, J., Phys. Stat. Sol. (a) **2**, K137 (1970)
Polomska, M., Jakubas, R., Ferroelectrics **106**, 57 (1990)
Pompe, W., Gong, X., Suo, Z., Speck, J.S., J. Appl. Phys. **74**, 6012 (1993)
Pouget, J., Maugin, G.A., Phys. Lett. **109A**, 389 (1985)
Poykko, S., Chadi, D.J., Appl. Phys. Lett. **75**, 2830 (1999)
Pradhan, M.M., Garg, R.K., Arora, M., Ferroelectrics **56**, 251 (1984)
Prasad, V.C.S., Subbarao, E.C., Ferroelectrics **15**, 143 (1977)
Preisach, F., Z. Phys. **94**, 277 (1935)
Pulvari, C.F., Kuebler, W., J. Appl. Phys. **29**, 1315 (1958a)
Pulvari, C.F., Kuebler, W., J. Appl. Phys. **29**, 1742 (1958b)
Putnis, A., Salje, E., Phase Transitions **48**, 85 (1994)
Rabe, H., Burkhardt, E., Rivera, J.-P., Schmid, H., Walker, E., Sadowski, W., Karkut, M.G., Antognazza, J.-M., Triscone, J.-M., Fischer, O., Ferroelectrics **92**, 129 (1989)
Rabe, H., Rivera, J.-P., Burkhardt, E., Schmid, H., Sci. Tech. Inform. **10**, 174 (1993)
Rabe, H., Rivera, J.-P., Schmid, H., Chaminade, J.-P., Nganga, L., Mat. Sci. Eng. **B5**, 243 (1990)
Rabe, K.A., Ahn, C.H., Triscone, J.M. (eds.): Physics of Ferroelectrics: A Modern Perspective. Springer, Berlin, Heidelberg, New York (2007)
Ramesh, R., Chan, W.K., Wilkens, B., Sands, T., Tarascon, J.M., Keramidas, V.G., Integr. Ferroelectr. **1**, 1 (1992)
Rao, C.N.R., Rao, K.J.: Phase Transitions in Solids. McGraw-Hill, New York (1978)
Rapoport, S.L., Dontsova, L.I., Sov. Phys. Crystallogr. **15**, 327 (1970)
Ratcliffe, P.J., Phys. Stat. Sol. (a) **70**, 211 (1982)
Ravi, R., Sangunni, K.S., Narayanan, P.S., J. Phys. E Sci. Instrum. **13**, 585 (1980)
Ravikumar, V., Rodrigues, R.P., Dravid, V.P., J. Am. Ceram. Soc. **80**, 1117 (1997)
Rayleigh, L., Philos. Mag.**23**, 225 (1887)
Resta, R., Rev. Mod. Phys. **66**, 899 (1994)
Rivera, J.-P., Ferroelectrics **141**, 159 (1993)
Robert, M.C., Lefaucheux, F., J. Cryst. Growth **65**, 637 (1983)
Robert, G., Damjanovic, D., Setter, N., Turik, A.V., J. Appl. Phys. **89**, 5067 (2001)
Robinson, G.Y., White, R.M., Appl. Phys. Lett. **10**, 320 (1967)
Roelofs, A., Böttger, U., Waser, R., Schlaphof, F., Trogisch, S., Eng, L.M., Appl. Phys. Lett. **77**, 3444 (2000)
Roelofs, A., Pertsev, N.A., Waser, R., Schlaphof, F., Eng, L.M., Ganpule, C., Nagarajan, V., Ramesh, R., Appl. Phys. Lett. **80**, 1424 (2002)
Roetschi, H., J. Sci. Instrum. **39**, 152 (1962)
Roitburd, A.L., Sov. Phys. Dokl. **16**, 305 (1971)
Roitburd, A.L., Phys. Stat. Sol. (a) **37**, 329 (1976)
Romanov, A.E., Pompe, W., Speck, J.S., J. Appl. Phys. **79**, 4037 (1996)
Romanov, A.E., Lefevre, M.J., Speck, J.S., Pompe, W., Streiffer, S.K., Foster, C.M., J. Appl. Phys. **83**, 2754 (1998)
Romanov, A.E., Vojta, A., Pompe, W., Lefevre, M.J., Speck, J.S., Phys. Stat. Sol. (a) **172**, 225 (1999)
Rosenman, G., Ferroelectrics **141**, 95 (1993)
Rosenman, G., Kugel, V.D., Ferroelectrics **157**, 105 (1994)
Rosenman, G., Kugel, V.D., Shur, D., Ferroelectrics **172**, 7 (1995)
Rosenman, G., Rez, I., J. Appl. Phys. **73**, 1904 (1993)

Roytburd, A.L., Elastic domains in ferroelectric epitaxial films., in Thin films Ferroelectric Material and Devices, edited by Ramesh, R., Kluwer Academic Publishers, Boston/Dordrecht/London (1997)
Roytburd, A.L., J. Appl. Phys. **83**, 228 (1998a)
Roytburd, A.L., J. Appl. Phys. **83**, 239 (1998b)
Roytburd, A.L., Alpay, S.P., Bendersky, L.A., Nagarajan, V., Ramesh, R., J. Appl. Phys. **89**, 553 (2001)
Rudyak, V.M., Kudzin, A.Y., Panchenk, T., Sov. Phys. Solid State **14**, 2112 (1973)
Rychetsky, I., Ferroelectrics **172**, 105 (1995)
Rychetsky, I., Schranz, W., J. Phys. Condens. Matter **5**, 1455 (1993)
Rychetsky, I., Schranz, W., J. Phys. Condens. Matter **6**, 11159 (1994)
Rychetsky, I., Schranz, W., Zielinski, P., Ferroelectrics **126**, 383 (1992)
Safránková, M., Czech. J. Phys. B **20**, 797 (1970a)
Safránková, M., Proceedings of the European Meeting on Ferroelectricity, Saarbruecken 1969, p. 231 (1970b)
Safrankova, M., Fousek, J., Kaczer, J., Proceedings of the International Meeting on Ferroelectricity, Prague 1966, p. 51 (1966)
Safrankova, M., Fousek, J., Kizhaev, S.A., Czech. J. Phys. B **17**, 559 (1967)
Sakata, H., Hamano, K., J. Phys. Soc. Jpn. **61**, 3786 (1992)
Sakata, H., Hamano, K., Ferroelectrics **140**, 169 (1993)
Salje, E.K.H.: Phase Transitions in Ferroelastic and Co-elastic Crystals. Cambridge University Press, Cambridge (1990)
Salje, E.K.H., Phase Transitions **55**, 37 (1995)
Salje, E., Chrosch, J., Ferroelectrics **183**, 85 (1996)
Salje, E., Hoppmann, G., Mater. Res. Bull. **11**, 1545 (1976)
Salomon, R.E., Ferroelectrics **33**, 185 (1981)
Sannikov, D.G., Sov. Phys. JETF **14**, 98 (1962)
Sapriel, J., Phys. Rev. B **12**, 5128 (1975)
Saurenbach, F., Terris, B.D., Appl. Phys. Lett. **56**, 1703 (1990)
Savage, A., Miller, R.C., J. Appl. Phys. **31**, 1546 (1960)
Sawada, A., Abe, R., Jpn. J. Appl. Phys. **5**, 401 (1966)
Sawada, A., Abe, R., Jpn. J. Appl. Phys. **6**, 699 (1967)
Sawyer, C.B., Tower, C.H., Phys. Rev. **35**, 269 (1930)
Scherf, Ch., Hahn, Th., Heger, G., Becker, R.A., Wunderlich, W., Klapper, H., Ferroelectrics **191**, 171 (1997)
Schlenker, M., Baruchel, J., Ferroelectrics **162**, 299 (1994)
Schloss, L.F., McIntyre, P.C., Hendrix, B.C., Bilodeau, S.M., Roeder, J.F., Gilbert, S.R., Appl. Phys. Lett. **81**, 3218 (2002)
Schmid, H., Rost Kristallov **7**, 32 (1967)
Schmid, H., Polarized light microscopy (PLM) of ferroelectric and ferroelastic domains in transmitted and reflected light, in Ferroelectric Ceramics, edited by Setter, N., Colla, E., pp. 107–126, Birkhäuser Verlag, Basel (1993)
Schmidt, V.H., Parker, R.S., J. Phys. Colloq. C2 **33**, 109 (1972)
Schmidt, G., Borchardt, G., Von Cieminski, J., Grützmann, D., Purinsch, E., Isupov, V.A., Ferroelectrics **42**, 3 (1982)
Schmid, H., Burkhardt, E., Walker, E., Brixel, W., Clin, M., Rivera, J.-P., Jorda, J.-L., Francois, M., Yvon, K., Z. Phys. B Condens. Matter **72**, 305 (1988a)
Schmid, H., Rivera, J.-P., Clin, M., Williams, A., Burkhardt, E., Physica C **153–155**, 1748 (1988b)
Schmahl, W.W., Putnis, A., Salje, E., Freeman, P., Graeme-Barber, A., Jones, R., Singh, K. K., Blunt, J., Edwards, P.P., Loram, J., Mirza, K., Philos. Mag.Lett. **60**, 241 (1989)
Schorn, P., Ellerkmann, U., Bolten, D., Boettger, U., Waser, R., Integr. Ferroelectr. **53**, 361 (2003)
Schranz, W., Phase Transitions **51**, 1 (1994)

Schranz, W., Rychetsky, I., J. Phys. Condens. Matter **5**, 3871 (1993)

Schranz, W., Streuselberger, T., Fuith, A., Warhanek, H., Götzinger, M., Ferroelectrics **88**, 139 (1988)

Schranz, W., Rychetsky, I., Warhanek, H., Ferroelectrics **141**, 61 (1993)

Scott, J.F., Araujo, C.A.P.d., Melnick, B.M., McMillan, L.D., Zuleeg, R., J. Appl. Phys. **70**, 382 (1991)

Scott, J.F., Kammerdiner, L., Parris, M., Traynor, S., Ottenbacher, V., Shawabkeh, A., Oliver, W.F., J. Appl. Phys. **64**, 787 (1988)

Scott, J.F., Araujo, C.A.P.d., Mcmillan, L.D., Ferroelectric thin films and thin film devices., in Ferroelectric Ceramics, edited by Setter, N., Colla, E., pp. 185–211, Birkhäuser Verlag, Basel (1993)

Seifert, A., Lange, F.F., Speck, J.S., J. Mater. Res. **10**, 680 (1995)

Seike, A., Amanuma, K., Kobayashi, S., Tatsumi, T., Koike, H., Hada, H., J. Appl. Phys. **88**, 3445 (2000)

Selyuk, B.V., Kristallografiya **16**, 356 (1971)

Sessler, G.M., Broadhurst, M.G., Davis, G.T., Gross, B., Mascarenhas, S., van Turnhout, J., West, J.E., Electrets. Springer-Verlag, Berlin (1980)

Setter, N., Damjanovic, D., Eng, L., Fox, G., Gevorgian, S., Hong, S., Kingon, A., Kohlstedt, H., Park, N.Y., Stephenson, G.B., Stolichnov, I., Tagantsev, A.K., Taylor, D.V., Yamada, T., Streiffer, S., J. Appl. Phys. **100**, 51606 (2006)

Shakmanov, V.V., Spivak, G.V., Sov. Phys. Solid State **10**, 802 (1968)

Shapiro, S.M., Gammon, R.W., Cummins, H.Z., Appl. Phys. Lett. **10**, 113 (1966)

Shekhtman, V.Sh., Shabel'nikov, L.G., Shmyt'ko, I.M., Aknazarov, S.Kh., Sov. Phys. Solid State **14**, 2690 (1973)

Shenyavskaya, L.A., Distler, G.I., Fizika tverdogo tela **18**, 1451 (1976)

Shepherd, I.W., Barkley, J.R., Solid State Commun. **10**, 123 (1972)

Sherman, V.O., Tagantsev, A.K., Setter, N., Iddles, D., Price, T., J. Appl. Phys. **99**, 074104 (2006)

Shiau, S.M., Anderson, T.L., Newnham, R.E., Cross, L.E., Mater. Res. Bull. **19**, 831 (1984)

Shil'nikov, A.V., Nesterov, V.N., Pozdnyakov, A.P., Fedorikhin, V.A., Shuvalov, L.A., Ferroelectrics **222**, 317 (1999a)

Shil'nikov, A.V., Pozdnyakov, A.P., Nesterov, V.N., Fedorikhin, V.A., Uzakov, R.E., Ferroelectrics **223**, 149 (1999b)

Shiojiri, M., Isshiki, T., Saijo, H., Tsujikura, M., Nakada, A., Nakano, Y., Ikeda, M., Nomura, T., Phys. Stat. Sol. (a) **129**, 353 (1992)

Shur, V.Ya., Letuchev, V.V., Popov, Yu.A., Sov. Phys. Solid State **24**, 1957 (1982)

Shur, V.Ya., Letuchev, V.V., Ovechkina, I.V., Fizika tverdogo tela **26**, 3474 (1984a)

Shur, V.Ya., Letuchev, V.V., Rumyantsev, E.L., Sov. Phys. Solid State **26**, 1521 (1984b)

Shur, V.Ya., Letuchev, V.V., Rumyantsev, E.L., Charikova, T.B., Zhurnal Tekhnicheskoi Fiziki **55**, 1666 (1985a)

Shur, V.Ya., Letuchev, V.V., Rumyantsev, E.L., Ovechkina, I.V., Fizika tverdogo tela **27**, 1585 (1985b)

Shur, V.Ya., Letuchev, V.V., Rumyantsev, E.L., Ovechkina, I.V., Fizika tverdogo tela **27**, 1232 (1985c)

Shur, V.Ya., Popov, Yu.A., Rumyantsev, E.L., Subbotin, A.L., Vshivkova, V.V., Izvestiya Akad. Nauk SSSR, ser. fiz. **49**, 1860 (1985d)

Shur, V.Ya., Gruverman, A.L., Korovina, N.V., Orlova, M.E., Sherstovinova, L.V., Fizika tverdogo tela **30**, 299 (1988)

Shur, V.Y., Gruverman, A.L., Letuchev, V.V., Rumyantsev, E.L., Subbotin, A.L., Ferroelectrics **98**, 29 (1989a)

Shur, V.Ya., Kuminov, V.P., Gruverman, A.L., Kopylova, E.B., Izvestiya Akad. Nauk SSSR, ser. fiz. **53**, 1403 (1989b)

Shur, V.Ya., Gruverman, A.L., Kuminov, V.P., Tonkachyova, N.A., Ferroelectrics **111**, 197 (1990)

Shur, V.Ya., Gruverman, A.L., Ponomarev, N.Y., Tonkachyova, N.A., Ferroelectrics **126**, 371 (1992)

Shur, V.Ya., Rumyantsev, E.L., Subbotin, A.L., Ferroelectrics **140**, 305 (1993a)

Shur, V.Ya., Subbotin, A.L., Kuminov, V.P., Ferroelectrics **140**, 101 (1993b)

Shur, V., Rumyantsev, E., Makarov, S., J. Appl. Phys. **84**, 445 (1998)

Shur, V., Rumyantsev, E., Batchko, R., Miller, G., Fejer, M., Byer, R., Ferroelectrics **221**, 157 (1999)

Shur, V.Ya., Rumyantsev, E.L., Nikolaeva, E.V., Shishkin, E.I., Appl. Phys. Lett. **77**, 3636 (2000a)

Shur, V.Ya., Rumyantsev, E.L., Nikolaeva, E.V., Shishkin, E.I., Fursov, D.V., Batchko, R. G., Eyress, L.A., Fejer, M.M., Byer, R.L., Appl. Phys. Lett. **76**, 143 (2000b)

Shur, V.Y., Rumyantsev, E.L., Nikolaeva, E.V., Shishkin, E.I., Baturin, I.S., J. Appl. Phys. **90**, 6312 (2001a)

Shur, V.Ya., Nikolaeva, E.V., Shishkin, E.I., Kozhevnikov, V.L., Chernykh, A.P., Terabe, K., Kitamura, K., Appl. Phys. Lett. **79**, 3146 (2001b)

Shur, V.Ya., Nikolaeva, E.V., Shishkin, E.I., Chernykh, A.P., Terabe, K., Kitamura, K., Ito, H., Nakamura, K., Ferroelectrics **269**, 195 (2002)

Shuvalov, L.A., Izvestiya Akad. Nauk SSSR, ser. fiz. **24**, 1416 (1960)

Shuvalov, L.A., Ivanov, N.R., Kristallografiya **9**, 363 (1964)

Shuvalov, L.A., J. Phys. Soc. Jpn. Suppl. **28**, 38 (1970)

Shuvalov, L.A. (ed.): Modern Crystallography IV. Springer-Verlag, Berlin (1988)

Shuvalov, L.A., Gridnev, S.A., Kudryash, V.I., Prasolov, B.N., Phys. Stat. Sol. (a) **83**, 131 (1984)

Shuvalov, L.A., Dudnik, E.F., Nepochatenko, V.A., Vagin, S.V., Izvestiya Akad. Nauk SSSR, ser. fiz. **49**, 297 (1985a)

Shuvalov, L.A., Dudnik, E.F., Wagin, S.V., Ferroelectrics **65**, 143 (1985b)

Shuvalov, L.A., Dudnik, E.F., Pozdeev, V.G., Izvestiya Akad. Nauk SSSR, ser. fiz. **51**, 2119 (1987)

Sidorkin, A.S., Ferroelectrics **150**, 313 (1993)

Sidorkin, A.S.: Domain Structure in Ferroelectrics and Related Materials. International Science Publishing, Cambridge (2006)

Simmons, J.G., J. Phys. Chem. Solids **32**, 2581 (1971)

Sinha, J.K., J. Sci. Instrum. **42**, 696 (1965)

Sinyakov, E.V., Duda, V.M., Dudnik, E.F., Yakunin, S.I., Sov. Phys. Solid State **13**, 2149 (1972)

Sirotin, Y.I., Shaskol'skaya, M.P., Foundations of Crystal Physics. Nauka, Moscow (1979)

Skliar, A., Rosenman, G., Lereah, Y., Angert, N., Tseitlin, M., Roth, M., Ferroelectrics **191**, 187 (1997)

Slater, J.S., Phys. Rev. **78**, 748 (1950)

Smolenskii, G.A., Bokov, V.A., Isupov, V.A., Krainik, N.N., Pasynkov, R.E., Sokolov, A.I., Ferroelectrics and Related Materials. Gordon and Breach, New York (1984)

Smolyaninov, I.I., Lee, C.H., Davis, C.C., Appl. Phys. Lett. **74**, 1942 (1999)

Smolyaninov, I.I., Liang, H.Y., Lee, C.H., Davis, C.C., Nagarajan, V., Ramesh, R., J. Microsc. **202**, 250 (2001)

Sogr, A.A., Ferroelectrics **97**, 47 (1989)

Sogr, A.A., Kopylova, I.B., Ferroelectrics **172**, 217 (1995)

Sogr, A.A., Kopylova, I.B., Ferroelectrics **191**, 193 (1996)

Someya, T., Azumi, T., Kobayashi, J., J. Phys. Soc. Jpn. Suppl. **28**, 374 (1970)

Song, T.K., Aggarwal, S., Prakash, A.S., Yang, B., Ramesh, R., Appl. Phys. Lett. **71**, 2211 (1997)

Sonin, E.B., Tagantsev, A.K., Zh. Eksp. Teor. Fiz. **94**, 315 (1988)

Sonin, E.B., Tagantsev, A.K., Ferroelectrics **98**, 291 (1989)

Speck, J.S., Pompe, W., J. Appl. Phys. **76**, 466 (1994)

Spivak, G.V., Igras, Ye., Zheludev, I.S., Doklady Akad. Nauk SSSR **122**, 54 (1958)

Spivak, G.V., Igras, E., Pryamkova, I.A., Zheludev, I.S., Sov. Phys. Crystallogr. **4**, 115 (1959)

Spycher, R., Buffat, P.A., Stadelmann, P., Helv. Phys. Acta **60**, 804 (1987)

Srikant, V., Tarsa, E.J., Clarke, D.R., Speck, J.S., J. Appl. Phys. **77**, 1517 (1995)

Stadler, H.L., J. Appl. Phys. **34**, 570 (1963)

Stadler, H.L., J. Appl. Phys. **37**, 1947 (1966)

Stadler, H.L., Zachmanidis, P.J., J. Appl. Phys. **34**, 3255 (1963)

Stadler, H.L., Zachmanidis, P.J., J. Appl. Phys. **35**, 2625 (1964a)

Stadler, H.L., Zachmanidis, P.J., J. Appl. Phys. **35**, 2895 (1964b)

Stankowska, J., Czarnecka, A., Ferroelectrics **98**, 95 (1989)

Stasyuk, I.V., Pavlenko, N., Polomska, M., Phase Transitions **62**, 167 (1997)

Steinhauer, D.E., Anlage, S.M., J. Appl. Phys. **89**, 2314 (2001)

Steinhauer, D.E., Vlahacos, C.P., Wellstood, F.C., Anlage, S.M., Canedy, C., Ramesh, R., Stanishevsky, A., Melngailis, J., Appl. Phys. Lett. **75**, 3180 (1999)

Stemmer, S., Streiffer, S.K., Ernst, F., Rühle, M., Philos. Mag.A **71**, 713 (1995)

Stengel, M., Spaldin, N.A., Nature **443**, 679 (2006)

Stephanovich, V.A., Lukyanchuk, I.A., Lahoche, L., Marssi, M.E., Phys. Rev. Lett. **94**, 047601 (2005)

Stern, E.A., Phys. Rev. Lett. **93**, 037601 (2004)

Stern, J.E., Terris, B.D., Mamin, H.J., Rugar, D., Appl. Phys. Lett. **53**, 2717 (1988)

Stolichnov, I., Tagantsev, A.K., Colla, E., Gentil, S., Hiboux, S., Baborowski, J., Muralt, P., Setter, N., J. Appl. Phys. **88**, 2154 (2000)

Stolichnov, I., Colla, E., Tagantsev, A., Bharadwaja, S.N., Hong, S., Setter, N., Cross, J.S., Tsukada, M., Appl. Phys. Lett. **80**, 4804 (2002a)

Stolichnov, I., Colla, E., Tagantsev, A.K., Bharadwaja, S.N., Hong, S., Setter, N., Cross, J.S., Tsukada, M.: Direct nanoscale observation of size effects on polarization instability in Pb(Zr,Ti)O3 film capacitors, in Ferroelectric Thin Films X, edited by Gilbert, S.R., Miyasaka, Y., Wouters, D., Trolier-McKinstry, S., Streiffer, S.K. (Mater. Res. Soc. Symp. Proc. **Volume 688**, p. 235, Warrendale, PA, 2002b)

Stolichnov, I., Tagantsev, A.K., Setter, N.: Polarization reversal model and prediction of temperature-dependent switching of ferroelectric capacitors, in Ferroelectric Thin Films XII, edited by Hoffmann-Eifert, S., Funakubo, H., Kingon, A.I., Koutsaroff, I., Joshi, V. (Mater. Res. Soc. Symp. Proc. **Volume 784**, p. 441, Warrendale, PA, 2004)

Stolichnov, I., Malin, L., Colla, E., Tagantsev, A.K., Setter, N., Appl. Phys. Lett. **86**, 012902 (2005a)

Stolichnov, I., Tagantsev, A.K., Colla, E., Setter, N., Cross, J.S., J. Appl. Phys. **98**, 084106 (2005b)

Streiffer, S.K., Parker, C.B., Romanov, A.E., Lefevre, M.J., Zhao, L., Speck, J.S., Pompe, W., Foster, C.M., Bai, G.R., J. Appl. Phys. **83**, 2742 (1998)

Streiffer, S.K., Basceri, C., Parker, C.B., Lash, S.E., Kingon, A.I., J. Appl. Phys. **86**, 4565 (1999)

Streiffer, S.K., Eastman, J.A., Fong, D.D., Thompson, C., Munkholm, A., Ramana Murty, M.V., Auciello, O., Bai, G.R., Stephenson, G.B., Phys. Rev. Lett. **89**, 67601 (2002)

Strukov, B.A., Toshev, S.D., Sov. Phys. Crystallogr. **9**, 349 (1964)

Strukov, B.A., Meleshina, V.A., Kalinin, V.I., Taraskin, S.A., Kristallografiya **17**, 1166 (1972a)

Strukov, B.A., Velichko, I.A., Baddur, A., Koptsik, V.A., Fizika tverdogo tela **14**, 1034 (1972b)

Strukov, B.A., Taraskin, S.A., Meleshina, V.A., Belugina, N.V., Yurin, V.A., Ferroelectrics **22**, 727 (1978)

Strukov, B.A., Levanyuk, A.P.: Ferroelectric Phenomena in Crystals. Springer, Berlin (1998)

Sturman, B.I., Fridkin, V.M.: The Photovoltaic and Photorefractive effects in Noncentrosymmetric Materials. Gordon and Breach Science Publishers, Philadelphia (1992)

Suda, F., J. Phys. Soc. Jpn. **47**, 1556 (1979)

Suda, F., Hatano, J., Futama, H., J. Phys. Soc. Jpn. **45**, 916 (1978a)

Suda, F., Hatano, J., Futama, H., J. Phys. Soc. Jpn. **44**, 244 (1978b)

Surowiak, Z., Dec, J., Skulski, R., Fesenko, E.G., Gavrilyatchenko, V.G., Semenchev, A.F., Ferroelectrics **20**, 277 (1978)
Surowiak, Z., Mukhortov, V.M., Dudkevich, V.P., Ferroelectrics **139**, 1 (1993)
Suzuki, K., Solid State Commun. **11**, 937 (1972)
Suzuki, I., Ishibashi, Y., Ferroelectrics **64**, 181 (1985)
Suzuki, S., Takagi, M., J. Phys. Soc. Jpn. **30**, 188 (1971)
Suzuki, S., Takagi, M., J. Phys. Soc. Jpn. **32**, 1302 (1972)
Sviridov, E.V., Alyoshin, V.A., Mukhortov, V.M., Golovko, Yu.I., Dudkevich, V.P., Fesenko, E.G., Ferroelectrics **56**, 149 (1984)
Sviridov, E., Alyoshin, V., Golovko, Y., Zakharchenko, I., Mukhortov, V., Dudkevich, V., Ferroelectrics **128**, 1 (1992)
Szczesniak, L., Szczepanska, L., Ferroelectrics **111**, 167 (1990)
Szczesniak, L., Sliwa, M., Hilczer, B., Meyer, K.-P., Margraf, R., Kristall und Technik **11**, 1189 (1976)
Szczesniak, L., Meyer, K.-P., Blumtritt, H., Hilczer, B., Le Bihan, R., Boudjema, E.H., Phys. Stat. Sol. (a) **88**, 93 (1985)
Szczesniak, L., Meyer, K.-P., Hilczer, B., Ferroelectrics **81**, 139 (1988)
Szczesniak, L., Hilczer, B., Meyer, K.-P., Ferroelectrics **172**, 227 (1995)
Tabarez-Muñoz, C., Rivera, J.-P., Bezinges, A., Monnier, A., Schmid, H., Jpn. J. Appl. Phys. Suppl. **24–2**, 1051 (1985)
Tagantsev, A.K., Phys. Rev. B **34**, 5883 (1986a)
Tagantsev, A.K., JETP Lett. **45**, 447 (1986b)
Tagantsev, A.K., Sov. Ph. Usp. **30**, 588 (1987)
Tagantsev, A.K., Ferroelectrics **79**, 57 (1988)
Tagantsev, A.K., Phase Transitions **35**, 119 (1991)
Tagantsev, A.K., Phys. Rev. Lett. **69**, 2760 (1993)
Tagantsev, A.K., Ferroelectrics **184**, 79 (1996)
Tagantsev, A.K., Phys. Rev. Lett. **94**, 247603 (2005)
Tagantsev, A.K., Fousek, J., Ferroelectrics **221**, 193 (1999)
Tagantsev, A.K., Gerra, G., J. Appl. Phys. **100**, 051607 (2006)
Tagantsev, A.K., Sonin, E.B., Ferroelectrics **98**, 297 (1989)
Tagantsev, A.K., Siny, I.G., Prokhorova, S.D., Izvestiya Akad. Nauk SSSR, ser. fiz. **51**, 2082 (1987)
Tagantsev, A.K., Pawlaczyk, C., Brooks, K., Setter, N., Integr. Ferroelectr. **4**, 1 (1994)
Tagantsev, A.K., Landivar, M., Colla, E., Setter, N., J. Appl. Phys. **78**, 2623 (1995a)
Tagantsev, A.K., Pawlaczyk, C., Brooks, K., Landivar, M., Colla, E., Setter, N., Integr. Ferroelectr. **6**, 309 (1995b)
Tagantsev, A.K., Stolichnov, I.A., Appl. Phys. Lett. **74**, 1326 (1999)
Tagantsev, A.K., Courtens, E., Arzel, L., Phys. Rev. B **64**, 224107 (2001a)
Tagantsev, A.K., Stolichnov, I., Colla, E.L., Setter, N., J. Appl. Phys. **90**, 1387 (2001b)
Tagantsev, A.K., Pertsev, N.A., Muralt, P., Setter, N., Phys. Rev. B **65**, 012104 (2002a)
Tagantsev, A.K., Stolichnov, I., Setter, N., Cross, J.S., Tsukada, M., Phys. Rev. B **66**, 214109 (2002b)
Tagantsev, A.K., Sherman, V.O., Astafiev, K.F., Venkatesh, J., Setter, N., J. Electroceramics **11**, 5 (2003)
Tagantsev, A.K., Muralt, P., Fousek, J.: Shape of piezoelectric hysteresis loop for non-ferroelastic switching, in Ferroelectric Thin Films XII, edited by Hoffmann-Eifert, S., Funakubo, H., Kingon, A.I., Koutsaroff, I., Joshi, V. (Mater. Res. Soc. Symp. Proc. **Volume 784**, p. 517, Warrendale, PA, 2004a)
Tagantsev, A.K., Stolichnov, I., Setter, N., Cross, J.S., J. Appl. Phys. **96**, 6616 (2004b)
Tagantsev, A.K., Sherman, V.O., Astafiev, K.F., Venkatesh, J., Setter, N., J. Electroceramics **14**, 199 (2005)

Takagi, M., Suzuki, S., Proceedings of the Sixth International Congress for Electron Microscopy, Kyoto 1966. vol. 1, 623 (1966)
Takagi, M., Suzuki, S., J. Phys. Soc. Jpn. **63**, 1580 (1994)
Takagi, M., Suzuki, S., Tanaka, K., J. Phys. Soc. Jpn. **23**, 134 (1967)
Takagi, M., Akaba, N., Suzuki, S., J. Phys. Soc. Jpn. **46**, 1811 (1979)
Tanaka, M., Honjo, G., J. Phys. Soc. Jpn. **19**, 954 (1964)
Takahashi, K., Takagi, M., J. Phys. Soc. Jpn. **44**, 1266 (1978a)
Takahashi, K., Takagi, M., J. Phys. Soc. Jpn. **44**, 1664 (1978b)
Takayama, R., Tomita, Y., J. Appl. Phys. **65**, 1666 (1989)
Takashige, M., Fukurai, N., Hamazaki, S.I., Shimizu, F., J. Korean Phys. Soc. (Proc. Suppl.) **32**, S721 (1998)
Takashige, M., Hamazaki, S., Takahashi, Y., Shimizu, F., Ferroelectrics **240**, 93 (2000)
Tanaka, M., Honjo, G., J. Phys. Soc. Jpn. **19**, 954 (1964)
Tanaka, M., Saito, R., Tsuzuki, K., Jpn. J. Appl. Phys. **21**, 291 (1982)
Taylor, G.W., Australian J. of Physics **15**, 549 (1962)
Taylor, G.W., IEEE Trans. Electron. Comput. **EC–14**, 881 (1965)
Taylor, G.W., J. Appl. Phys. **37**, 593 (1966)
Taylor, D.V., Damjanovic, D., Colla, E., Setter, N., Ferroelectrics **225**, 91 (1999)
Terris, B.D., Stern, J.E., Rugar, D., Mamin, H.J., Phys. Rev. Lett. **63**, 2669 (1989)
Terris, B.D., Stern, J.E., Rugar, D., Mamin, H.J., J. Vac. Sci. Technol. **A8**, 374 (1990)
Theis, C.D., Schlom, D.G., J. Mater. Res. **12**, 1297 (1997)
Tietze, H., Müllner, M., Jex, H., Phys. Stat. Sol. (a) **66**, 239 (1981)
Tikhomirov, O.A., J. Appl. Phys. **80**, 2358 (1996)
Tikhomirova, N.A., Dontsova, L.I., Pikin, S.A., Ginzberg, A.V., Adomenas, P.V., Sov. Phys. Crystallogr. **23**, 701 (1978)
Tikhomirova, N.A., Dontsova, L.I., Pikin, S.A., Shuvalov, L.A., JETP Lett. **29**, 37 (1979)
Tikhomirova, N.A., Pikin, S.A., Shuvalov, L.A., Dontsova, L.I., Popov, E.S., Shilnikov, A. V., Bulatova, L.G., Ferroelectrics **29**, 145 (1980a)
Tikhomirova, N.A., Shuvalov, L.A., Baranov, A.I., Karasev, A.R., Dontsova, L.I., Popov, E. S., Shilnikov, A.V., Bulatova, L.G., Ferroelectrics **29**, 51 (1980b)
Tikhomirova, N.A., Dontsova, L.I., Pikin, S.A., Shuvalov, L.A., Kristallografiya **30**, 734 (1985a)
Tikhomirova, N.A., Ginzberg, A.V., Dontsova, L.I., Pikin, S.A., Shuvalov, L.A., Kristallografiya **30**, 330 (1985b)
Tikhomirova, N.A., Shuvalov, L.A., Dontsova, L.I., Ferroelectrics **70**, 1 (1986a)
Tikhomirova, N.A., Shuvalov, L.A., Dontsova, L.I., Bulatova, L.G., Potikha, L.Z., Sov. Phys. Crystallogr. **31**, 682 (1986b)
Tikhomirova, N.A., Adomenas, P.V., Volnyanskii, M.D., Ginzberg, A.V., Sov. Phys. Crystallogr. **36**, 853 (1991a)
Tikhomirova, N.A., Ginzberg, A.V., Chumakova, S.P., Volnyanskii, M.D., Polomska, M., Adomenas, P.V., Ferroelectrics Letters **13**, 81 (1991b)
Tikhomirov, O., Red'kin, B., Trivelli, A., Levy, J., J. Appl. Phys. **87**, 1932 (2000)
Tilley, D.R., Zeks, B., Ferroelectrics **134**, 313 (1992)
Tomashewski, P.E., Phase Transitions **38**, 221 (1992a)
Tomashewski, P.E., Phase Transitions **38**, 127 (1992b)
Tolédano, P., Dmitriev, V., Ferroelectrics **191**, 85 (1997)
Tolédano, P., Tolédano, J.-C., Phys. Rev. B **25**, 1946 (1982)
Toledano, J.C., Toledano, P.: The Landau theory of phase transitions. World Scientific, Singapore (1988)
Tomek, J., Janovec, V., Fousek, J., Zikmund, Z., Ferroelectrics **20**, 253 (1978)
Tomita, N., Orihara, H., Ishibashi, Y., J. Phys. Soc. Jpn. **58**, 1190 (1989)
Tonkov, E.Y.: High Pressure Phase Transformations. Gordon and Breach, Philadelphia (1992)

Toshev, S., Proceedings of the International Meeting on Ferroelectricity, Prague 1996, V.II, 31 (1966)
Toshev, S.D., Sov. Phys. Crystallogr. **8**, 87 (1963a)
Toshev, S.D., Sov. Phys. Crystallogr. **8**, 541 (1963b)
Toyoda, H., Waku, S., Hirabayashi, H., J. Phys. Soc. Jpn. **14**, 1003 (1959)
Tran, C.D., Gerbaux, X., Hadni, A., Ferroelectrics **33**, 31 (1981)
Traynor, S., Hadnagy, T., Kammerdiner, L., Integr. Ferroelectr. **16**, 63 (1997)
Tsai, F., Khiznichenko, V., Cowley, J.M., Ultramicroscopy **45**, 55 (1992)
Tsao, J.K.: Materials Fundamentals for Molecular Beam Epitaxy. Academic, New York (1993)
Tsunekawa, S., Takei, H., J. Phys. Soc. Jpn. **40**, 1523 (1976)
Tsukamoto, T., Hatano, J., Futama, H., J. Phys. Soc. Jpn. Suppl. B **49**, 155 (1980)
Tsukamoto, T., Hatano, J., Futama, H., J. Phys. Soc. Jpn. **51**, 3948 (1982)
Tsukamoto, T., Hatano, J., Futama, H., J. Phys. Soc. Jpn. **53**, 838 (1984)
Tsunekawa, S., Fukuda, T., Ozaki, T., Yoneda, Y., Okabe, T., Terauchi, H., J. Appl. Phys. **84**, 999 (1998)
Tsunekawa, S., Ichikawa, J., Nagata, H., Applied Surface Science **137**, 61 (1999)
Tsunekawa, S., Fukuda, T., Ozaki, T., Yoneda, Y., Terauchi, H., Appl. Phys. Lett. **71**, 1486 (1997)
Turik, A.V., Sov. Phys. Solid State **5**, 885 (1963)
Turik, A.V., Sov. Phys. Solid State **5**, 2141 (1964)
Turik, A.V., Sov. Phys. Solid State **12**, 688 (1970)
Tybell, T., Paruch, P., Giamarchi, T., Triscone, J.-M., Phys. Rev. Lett. **89**, 97601 (2002)
Tylczynski, Z., Acta Phys. Polon. **A 51**, 865 (1977)
Ubbelohde, A.R., Woodward, I., Nature **156**, 20 (1945)
Uchida, N., Ikeda, T., Jpn. J. Appl. Phys. **4**, 867 (1965)
Ujma, Z., Dmytrov, D., Handerek, J., Ferroelectrics **81**, 107 (1988)
Ungar, S., Hadni, A., Thomas, R., Strimer, P., Ferroelectrics **33**, 43 (1981)
Unruh, H.-G., Z. Angew. Physik **16**, 315 (1963)
Unruh, H.G., Phys. kondens. Materie **4**, 275 (1965)
Usher, T.D., Poole, J.C.P., Farach, H.A., Ferroelectrics **110**, 67 (1990)
Uwe, H., Sakudo, T., Physical Review B **13**, 271 (1976)
Vagin, S.V., Dudnik, E.F., Izvestiya Akad. Nauk SSSR, ser. fiz. **47**, 500 (1983)
Vagin, S.V., Dudnik, E.F., Sinyakov, E.V., Izvestiya Akad. Nauk SSSR, ser. fiz. **43**, 1735 (1979)
Vaks, V.G.: Introduction to the Microscopic Theory of Ferroelectrics (in Russian). Nauka, Moscow (1973)
Valasek, J., Phys. Rev. **17**, 475 (1921)
Vendik, O.G., Zubko, S.P., J. Appl. Phys. **82**, 4475 (1997)
Vendik, O.G., Zubko, S.P., J. Appl. Phys. **88**, 5343 (2000)
Verwerft, M., Van Tendeloo, G., Van Landuyt, J., Amelinckx, S., Ferroelectrics **97**, 5 (1989)
Vlasko-Vlasov, V.K., Indenbom, M.V., Ossipyan, Yu.A., Physica C **153–155**, 1677 (1988)
Vlokh, R.O., Vlokh, O.V., Kabelka, H., Warhanek, H., Ferroelectrics **190**, 89 (1997)
Vlokh, R., Uesu, Y., Yamada, Y., Skab, I., Vlokh, O., J. Phys. Soc. Jpn. **67**, 3335 (1998)
Volk, T., Woehlecke, M., Lithium Niobate. Defects, Photorefraction and Ferroelectric Switching. Springer Series in Materials Science (2008)
von Cieminski, J., Schmidt, G., Ferroelectrics **81**, 233 (1988)
von Cieminski, J., Kleint, C., Beige, H., Höche, R., Ferroelectrics **109**, 95 (1990)
von Hippel, A., Rev. Mod. Phys. **22**, 221 (1950)
Vysochanskii, Yu.M., Maior, M.M., Perechinskii, S.I., Tikhomirova, N.A., Sov. Phys. Crystallogr. **37**, 90 (1992)
Wadhawan, V.K.: Introduction to Ferroic Materials. Gordon and Breach Science Publishers, The Netherlands (2000)

Wadhawan, V.K., Phase Transitions **3**, 3 (1982)
Wadhawan, V.K., Phase Transitions **9**, 297 (1987)
Wahlstrom, E.E.: Optical Crystallography. 5th edn. John Wiley, New York (1979)
Wang, B., Xiao, Z., J. Appl. Phys. **88**, 1464 (2000)
Wang, S., Dudley, M., Cheng, L.K., Bierlein, J.D., Bindloss, W.: Imaging of ferroelectric domains in $KTiOPO_4$ single crystals by synchrotron X-ray topography, in Ferroelectric Thin Films III, edited by Myers, E.R., Tuttle, B.A., Desu, S.B., Larsen, P.K. (Mater. Res. Soc. Symp. Proc. **Volume 310**, p. 29, Warrendale, PA, 1993)
Wang, Y.G., Zhong, W.L., Zhang, P.L., Phys. Rev. B **51**, 5311 (1995)
Wang, Y.G., Dec, J., Kleemann, W., J. Appl. Phys. **84**, 6795 (1998)
Wang, R., Zhu, Y., Shapiro, S.M., Phys. Rev. B **61**, 8814 (2000a)
Wang, Y.-G., Kleemann, W., Woike, T., Pankrath, R., Phys. Rev. B **61**, 3333 (2000b)
Wang, Y.L., Tagantsev, A.K., Damjanovic, D., Setter, N., Yamarkin, V.K., Sokolov, A.I., Phys. Rev. B **73**, 132103 (2006)
Wang, Y.L., Tagantsev, A.K., Damjanovic, D., Setter, N., Appl. Phys. Lett. **91**, 62905 (2007a)
Wang, Y.L., Tagantsev, A.K., Damjanovic, D., Setter, N., Yarmarkin, V.K., Sokolov, A.I., Lukyanchuk, I.A., J. Appl. Phys. **101**, 104115 (2007b)
Warren, W.L., Dimos, D., Appl. Phys. Lett. **64**, 866 (1994)
Warren, W.L., Dimos, D., Pike, G.E., Tuttle, B.A., Raymond, M.V., Ramesh, R., Evans, J.T., Appl. Phys. Lett. **67**, 866 (1995a)
Warren, W.L., Dimos, D., Tuttle, B.A., Pike, G.E., Schwartz, R.W., Clew, P.J., McIntyre, D. C., J. Appl. Phys. **77**, 6695 (1995b)
Waser, R., Klee, M., Integr. Ferroelectr. **2**, 23 (1992)
Weber, H.P., Tofield, B.C., Liao, P.F., Phys. Rev. B **11**, 1152 (1975)
Wechsler, M.S., Lieberman, D.S., Read, T.A., Trans. Amer. Inst. Mining Met. Engrs. **197**, 1503 (1953)
Weidmann, E.J., Anderson, J.C., Thin Solid Films **7**, 27 (1971)
Weinmann, D., Vogt, H., Phys. Stat. Sol. (a) **23**, 463 (1974)
Wemple, S.H., DiDomenico, M.Jr., Camlibel, I., Appl. Phys. Lett. **12**, 209 (1968)
Wicker, A., Lotz, B., Wittmann, J.C., Legrand, J.F., Polymer Commun. **30**, 251 (1989)
Wicker, A., Legrand, J.F., Lotz, B., Wittmann, J.C., Ferroelectrics **106**, 51 (1990)
Wieder, H.H., J. Appl. Phys. **28**, 367 (1957)
Wiesendanger, E., Czech. J. Phys. B **23**, 91 (1973)
Willard, G.W.: Use of the Etch Technique For Determining Orientation and Twinning in Quartz Crystals. In Quartz Crystals For Electrical Circuits, edited by Heising, R.A., pp. 164–204, D.Van Nostrand Co., New York (1947)
Williams, D.B., Carter, C.B.: Transmission Electron Microscopy. Plenum Press, New York, (2004)
Wood, E.A., Miller, R.C., Remeika, J.P., Acta Cryst. **15**, 1273 (1962)
Wooster, W.A., Wooster, N., Nature **157**, 405 (1946)
Wruck, B., Salje, E.K.H., Zhang, M., Abraham, T., Bismayer, U., Phase Transitions **48**, 135 (1994)
Xu, Y.: Ferroelectric Materials and their Applications. North-Holland, Amsterdam (1991)
Yakunin, S.I., Shakmanov, V.V., Spivak, G.V., Vasil'eva, N.V., Sov. Phys. Solid State **14**, 310 (1972)
Yamada, Y., Shirane, G., Linz, A., Phys. Rev. **177**, 848 (1969)
Yamada, M., Nada, N., Saitoh, M., Watanabe, K., Appl. Phys. Lett. **62**, 435 (1993)
Yamamoto, T., Jpn. J. Appl. Phys. **35**, 5104 (1996)
Yamamoto, N., Yagi, K., Honjo, G., Phys. Stat. Sol. (a) **42**, 257 (1977a)
Yamamoto, N., Yagi, K., Honjo, G., Phys. Stat. Sol. (a) **44**, 147 (1977b)
Yang, T.J., Mohideen, U., Gupta, M.C., Appl. Phys. Lett. **71**, 1960 (1997)
Yang, T.J., Gopalan, V., Swart, P.J., Mohideen, U., Phys. Rev. Lett. **82**, 4106 (1999)
Yen, B.M., Chen, H., J. Appl. Phys. **85**, 853 (1999)

Yin, Q.R., Yang, Y., Zhang, B.Y., Luo, H.S., Yin, Z.W., J. Korean Phys. Soc. (Proc. Suppl.) **32**, S719 (1998)
Yin, Q.R., Liao, J., Zhang, B.Y., Yang, Y., Hang, F.M., Ferroelectrics **231**, 11 (1999)
Yokota, S., J. Phys. Soc. Jpn. **51**, 1884 (1982)
Yoneda, Y., Okabe, T., Sakaue, K., Terauchi, H., J. Appl. Phys. **83**, 2458 (1998)
Yoo, I., Desu, S., Phys. Stat. Sol. (a) **133**, 565 (1992)
Yudin, S.P., Panchenko, T.V., Kudzin, A.Yu., Ferroelectrics **18**, 45 (1978)
Zapart, M.B., Snoeck, E., Saint-Gregoire, P., Ferroelectrics **191**, 179 (1997)
Zavala, G., Fendler, J.H., Trolier McKinstry, S., J. Appl. Phys. **81**, 7480 (1997)
Zen'iti, K., Husimi, K., Kataoka, K., J. Phys. Soc. Jpn. **13**, 661 (1958)
Zeyen, C.M.E., Meister, H., Ferroelectrics **14**, 731 (1976)
Zhang, L., Ren, X., Phys. Rev. B **73**, 094121 (2006)
Zhang, L.X., Ren, X., Phys. Rev. B **71**, 174108 (2005)
Zhang, X., Hashimoto, T., Joy, D.C., Appl. Phys. Lett. **60**, 784 (1992)
Zhang, X., Joy, D.C., Zhang, Y., Hashimoto, T., Allard, L., Nolan, T.A., Ultramicroscopy **51**, 21 (1993)
Zhang, X., Joy, D.C., Allard, L.F., Nolan, T.A., Ferroelectrics **157**, 159 (1994)
Zhang, B.Y., Jiang, F.M., Yang, Y., Yin, Q.R., Ferroelectr. Lett. **22**, 21 (1996)
Zhao, J., Yang, P., Jiang, S., Jiang, X., Jiang, J., Xian, D., Geng, Z., Zou, Q., Appl. Phys. Lett. **59**, 1952 (1991)
Zhirnov, V.A., Zh. Eksp. Teor. Fiz. **35**, 1175 (1958)
Zhelnova, O., Fesenko, O., Sov. Phys. Solid State **27**, 4 (1985)
Zheludev, I.S., Shuvalov, L.A., Kristallografiya **1**, 681 (1956)
Zheludev, I.S., Shuvalov, L.A., Kristallografiya **4**, 459 (1959)
Zhong, W., Vanderbilt, D., Rabe, K.M., Phys. Rev. B **52**, 6301 (1995)
Zhu, S., Cao, W., Phys. Rev. Lett. **79**, 2558 (1998)
Zhu, Y.M., Suenaga, M., Philos. Mag.A **66**, 457 (1992)
Zhu, J., Zhang, X., Zhu, Y., Desu, S.B., J. Appl. Phys. **83**, 1610 (1998)
Zikmund, Z., Czech. J. Phys. B **34**, 932 (1984)
Zikmund, Z., Fousek, J., Ferroelectrics **79**, 73 (1988)
Zikmund, Z., Fousek, J., Phys. Stat. Sol. (a) **112**, 625 (1989)
Ziman, J.M.: Principles of the Theory of Solids. Cambridge University Press, London (1972)
Zurbuchen, M.A., Asayama, G., Schlom, D.G., Phys. Rev. Lett. **88**, 107601 (2002)
Zvereva, O.V., Mininzon, Yu.M., Smol'skii, I.L., Kristallografiya **37**, 778 (1992)
Zwicker, B., Scherrer, P., Helv. Phys. Acta **17**, 346 (1944)
Zybill, C.E., Boubekeur, H., Radojkovic, P., Schwartzkopff, M., Hartmann, E., Koch, F., Gross, G., Rezek, B., Bruchhaus, R., Wersing, W.: Domain Structure of poled ferroelectric (111) PZT ($PbTi_{0.75}Zr_{0.25}O_3$) Films, in Ferroelectric Thin Films VII, edited by Jones, R.E., Schwartz, R.W., Summerfelt, S., Yoo, I.K. (Mater. Res. Soc. Symp. Proc. **Volume 541**, p. 449, Warrendale, PA, 1999)
Zybill, C.E., Li, B., Koch, F., Graf, T., Phys. Stat. Sol. (a) **177**, 303 (2000)

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