K. Kajimura H. Hayakawa (Eds.)

Advances in Superconductivity III

Proceedings of the 3rd International Symposium on
Superconductivity (ISS '90), November 6-9, 1990, Sendai

ISTEC

With 1546 Figures

Springer-Verlag Tokyo Berlin Heidelberg New York
London Paris Hong Kong Barcelona

Dr. KOJI KAJIMURA
Electrotechnical Laboratory
Umezono, Tsukuba
305 Japan

Prof. Dr. HISAO HAYAKAWA
School of Engineering
Nagoya University
Chikusa-ku, Nagoya
464 Japan

ISBN-13:978-4-431-68143-4 e-ISBN-13:978-4-431-68141-0
DOI: 10.1007/978-4-431-68141-0

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in other ways, and storage in data banks.

© Springer-Verlag Tokyo 1991
Softcover reprint of the hardcover 1st edition 1991

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Foreword

Since the discovery of high temperature superconductors, many new materials have been invented. In the last year, several new materials were also discovered, but their critical temperatures are still below 100K. Precise physical and chemical work has made tremendous progress in the theoretical and experimental study of physical properties and carrier state characterizations. The de Haas van Alphen effect measurement showed the existence of a Fermi surface in YBCO. Flux dynamics is a well-known new problem in which flux creep and irreversibility line features are especially important for a fundamental understanding of the critical current and flux pinning. Flux pinning centers which are intentionally added using non-superconducting precipitates, neutrons, and protons, etc. increase critical currents to practical levels. The analysis of electric and magnetic properties are expected to reveal the pinning mechanism and also to further application development.

As for wires and bulks, many melt-like sintering techniques have improved the material performance of critical current densities. A new seeding Quench-Melt-Growth technique enlarged crystal size and increased the repulsion force. These melting processes, in conjunction with a mechanical strength improvement have been effectively introduced into wire fabrication in order to realize kilometer range wires and will put the oxide wires to practical use. Where thin film is concerned, when many fabrication methods had been developed using the assistance effect of activated oxygen such as ozone and oxygen radicals, a high current density of 10^6A/cm^2 at 77K was reported. For further improvement, substrate materials should be considered as the most important problem regarding lattice constant matching. The progress of thin film technology is accelerating the efforts to develop electronics devices. High frequency passive elements are very promising applications because of their surface loss advantage. Superconducting antenna, resonators, etc. have shown higher performances than those obtained by non-superconducting devices. Great efforts have been devoted to developing a tunnel junction using hetero-epitaxial techniques, which have resulted in the hysterisis of current voltage characteristics at 77K. The confirmation of intensity oscillation in RHEED signal indicates a new technology of layer-by-layer epitaxy for creating new atomic layer materials. A new device, a superconducting flux flow transistor operating at 40GHz, has been developed. As for systems applications, magnetic levitation, superconducting propulsion, and energy systems applications have been intensively studied for future use.

As mentioned above, superconductivity research has entered the second phase of study on application feasibility, although the fundamental research in new oxide materials and physics is still important. The world's first human levitation using about 250 superconductor pieces, fabricated by Melt Powder Melt Growth, was the most exciting exhibition. It was a fundamental experiment in magnetic levitation, but it indicates that a new application field will be opened with aggressive, but inspired research.

SHOJI TANAKA
Vice President, ISTEK

Preface

Advances in Superconductivity III is the proceedings of the Third International Symposium on Superconductivity (ISS '90) held in Sendai, Japan, November 6-9, 1990, under the cosponsorship of the International Superconductivity Technology Center (ISTEC), Miyagi Prefecture, Sendai City, Tohoku Economic Federation, and the Industrial Vitalization Center for Tohoku. Approximately 710 participants, including 55 from 12 overseas countries, attended the Symposium. One of the characteristic features of ISS '88-'90 was to offer a forum where the world's scientists, engineers, business administrators, and entrepreneurs — in the spirit of international cooperation and friendly rivalry — present, exchange, and discuss their views and findings on superconductivity and its future applications. In fact, in ISS '90, as many as 319 papers, including 137 from industry, 85 from universities, 53 from the Superconductivity Research Laboratory (SRL), and 44 from public institutes, were presented.

The volume begins with the Organization of ISS '90 and a list of its Committees. The papers from two "Special Plenary Lectures" made at the opening of the Symposium by J. Clarke (University of California, Berkeley) and by M. Murakami (SRL) and four "Plenary Lectures" are arranged at the beginning of the volume in the order in which they were presented in the Symposium program. The contents of this volume are arranged as (1) physics, (2) chemistry, (3) flux pinning, (4) wires, tapes, and bulks, (5) preparation and properties of thin films, and (6) application to devices and systems. Invited papers, which are distinguished by their length (six-eight pages) from the contributed papers (four pages), are arranged at the beginning of sections or subsections.

Remarkable progress was reported at the Symposium in the improvement of bulk materials, wires and tapes, especially in strong flux pinning in MPMG-processed bulk YBaCuO, which, in the near future, will open doors to applications in high-performance electrical machines. Considerable efforts have been made to develop high-quality thin films, including hetero-epitaxial films, in order to realize electronic devices.

The editors are indebted to many people for invaluable assistance at various stages of the preparation of the Symposium. The International Advisory Committee helped us in selecting the invited speakers. The Program and Editorial Committee selected invited papers, arranged all the invited and contributed papers, and refereed the contributed papers with the assistance of many scientists who participated in the Symposium. We would like to acknowledge all the people who helped to make the Symposium a success.

Finally, we are very grateful to the authors who cooperated by carefully preparing their manuscripts for *Advances in Superconductivity III*.

KOJI KAJIMURA
HISAO HAYAKAWA

Organization of ISS '90

Sponsored by:

International Superconductivity Technology Center

Co-sponsored by:

Miyagi Prefecture

City of Sendai

Tohoku Economic Federation

Industrial Vitalization Center for Tohoku

Supported by:

Ministry of International Trade and Industry Agency of Industrial Science
and Technology

Tohoku Bureau of International Trade and Industry

Science and Technology Agency

New Energy and Industrial Technology Development Organization

Ceramic Society of Japan

The Chemical Society of Japan

The Cryogenic Society of Japan

The Federation of Electric Power Companies

The Institute of Electrical Engineers of Japan

The Institute of Electronics Information and Communication Engineers, Japan

The Iron and Steel Institute of Japan

Japan Chemical Industry Association

The Japan Electrical Manufactures' Association

Japan Electronic Industry Development Association

Japan Fine Ceramics Association

The Japan Institute of Metals

The Japan Iron and Steel Federation

The Japan Key Technology Center

Japan Mining Industry Association

The Japan Society of Applied Physics

The Japanese Electric Wire & Cable Maker's Association

The Magnetic Society of Japan

Miyagi Industry Association

Physical Society of Japan

Research and Development Association for Future Electron Devices

Sendai Convention Bureau

Tohoku Intelligent Cosmos Promotion Council

Organizing Committee

Chairman:

G. HIRAIWA President, ISTEK

Members:

J. AOI Vice President, ISTEK
K. FUEKI Professor, Faculty of Science and Technology Science
University of Tokyo
S. HOMMA Governor, Miyagi Prefectural Government
T. ISHII Mayor, City of Sendai
H. KASHIWAGI Director-General, Electrotechnical Laboratory
T. MASUMOTO Director-Professor, IMR, Tohoku University
Y. MUTO Emeritus Professor, Tohoku University
S. NAKAJIMA Chairman of Department of Physics, Tokai University,
School of Science
S. SAITO Chairman, The Society of Non-Traditional Technology
M. SUGIURA Director-General, AIST, MITI
T. TAMAKAWA Chiriman, The Industrial Vitalization Center for
Tohoku
S. TANAKA Vice President, ISTEK
D. TERANISHI Director-General, Tohoku Bureau of International
Trade and Industry
T. YAMAMOTO Vice President, ISTEK
S. YAMAMURA Member, The Japan Academy

International Advisory Committee

B. BATLOGG AT & T Bell Laboratories
M.R. BEASLEY Stanford University
P. CHAUDHARI IBM T.J. Watson Research Center
C.W. CHU University of Houston
J. CLARKE University of California-Berkeley
R.C. DYNES AT & T Bell Laboratories
J.E. EVETTS University of Cambridge
D.K. FINNEMORE AMES Laboratory
K. FOSSHEIM Norwegian Institute of Technology
K. FUEKI Science University of Tokyo
W. KLOSE Karlsruhe Nuclear Research Center
P. KOMAREK Karlsruhe Nuclear Research Center
D.C. LARBALESTIER University of Wisconsin
W.Y. LIANG University of Cambridge
M.B. MAPLE University of California-San Diego
K.A. MÜLLER IBM Zürich
Y. MUTO Tohoku University
S. NAKAJIMA Tokai University
B. RAVEAU University of Caen
J.M. ROWELL Conductus Inc.
A.W. SLEIGHT Oregon State University
M. SUENAGA Brookhaven National Laboratory

Steering Committee

Chairman:

S. TANAKA Vice President, ISTE

Members:

K. ARATAME	Tohoku Electric Power Co., Inc.
Y. FURUTO	The Furukawa Electric Co., Ltd.
E. MASADA	The University of Tokyo
T. MORIYA	City of Sendai
I. NAKAMURA	Miyagi Prefectural Government
O. OHTSUKI	Fujitsu Laboratories Ltd.
M. SHIMAKITA	Mitsubishi Heavy Industry, Ltd.
Y. SYONO	Tohoku University
K. UCHINOKURA	The University of Tokyo
K. WASA	Matsushita Electric Industrial Co., Ltd.
A. YAMAZAKI	Tohoku Bureau of International Trade and Industry
S. YOSHII	Ube Industries, Ltd.

Program and Editorial Committee

Chairman:

K. KAJIMURA Director, Electrotechnical Laboratory

Members:

H. ABE	Oki Electric Industry Co., Ltd.
K. ANDO	Toshiba Corporation
Y. BANDO	Kyoto University
J. FUJIE	Railway Technical Research Institute
H. FUKUYAMA	The University of Tokyo
H. HAYAKAWA	Nagoya University
H. IGARASHI	NEC Corporation
I. IGUCHI	University of Tsukuba
N. KOBAYASHI	Tohoku University
T. KOBAYASHI	Osaka University
N. KOSHIZUKA	SRL-ISTEC
M. KOYANAGI	Electrotechnical Laboratory
S. MATSUDA	Hitachi Ltd.
T. MATSUSHITA	Kyushu Institute of Technology
M. NAKAO	SANYO Electric Co., Ltd.
K. SATO	Mitsubishi Electric Corp.
K. SAWANO	Nippon Steel Corporation
Y. SYONO	Tohoku University
K. TADA	Sumitomo Electric Industries, Ltd.
T. TANAKA	Central Research Institute of Electric Power Industry
Y. TANAKA	The Furukawa Electric Co., Ltd.
T. TOMINAGA	Chubu Electric Power Co., Inc.
S. UCHIDA	The University of Tokyo
H. YAMAUCHI	SRL-ISTEC

General Affairs Committee

Chairman:

Y. SYONO Professor, Tohoku University

Members:

A. GONOI	Miyagi Prefectural Government
H. HIRAMA	The Industrial Vitalization Center for Tohoku
S. KOMAGATA	Tohoku Bureau of International Trade and Industry
Y. MATSUO	Matsushita Electric Ind., Ltd.
K. MOROOKA	Miyagi Industrial Association
K. SATOH	Tohoku Electric Power Co., Inc.
K. SATO	City of Sendai
T. SHIONO	Showa Electric Wire & Cable Co., Ltd.
Y. SUGINO	Sendai Convention Bureau
Y. TAKEOKA	Nippon Steel Corporation
N. TSUBOUCHI	NEC Corporation
K. WATANABE	Tohoku University

Table of Contents

1 Plenary Lectures

High- T_c Thin-Film Microelectronics J. CLARKE, D. QUAN, M.J. FERRARI, J.J. KINGSTON, A.H. MIKLICH, F.C. WELLSTOOD	3
Flux Pinning in Y-Ba-Cu-O Superconductor Prepared by Melt-Powder-Melt-Growth Process M. MURAKAMI, T. OYAMA, H. FUJIMOTO, S. GOTOH, K. YAMAGUCHI, T. TAKATA, Y. SHIOHARA, N. KOSHIZUKA, S. TANAKA	11
Electronic Raman Scattering in High Temperature Superconductors M.V. KLEIN, F. SLAKEY, D. REZNIK, J.P. RICE, D.M. GINSBERG	17
Fabrication and Superconducting Properties of $YBa_2Cu_3O_7/PrBa_2Cu_3O_7$ Artificial Superlattices J.-M. TRISCONE, L. ANTOGNAZZA, O. BRUNNER, L. MIÉVILLE, M. KARKUT, T. BOICHAT, O. EIBL, Ø. FISCHER	23
A 4.2K Josephson Digital Computer S. TAKADA	29
United States Progress in Superconducting Magnetic Energy Storage (SMES) R.B. SCHAIKER	35

2 Physics

2.1 Theoretical Studies

Superconducting Properties in Layered Cuprate Oxides M. TACHIKI, T. KOYAMA, S. TAKAHASHI	45
Gauge Field Theory of the High- T_c Superconductors N. NAGAOSA	53
Superconductivity due to Interband Pair-Transfer Interaction Divergently Enhanced by a Filled Band K. YAMAJI, T. KINOSHITA	57
Mott-Hubbard Band and Charge Transfer Gap in La_2CuO_4 M. KATAOKA	61
Electronic States of Metal (Ti,V,Cr) Oxides K. FUKUSHIMA, H. ADACHI	65

Superconductivity in a System with Intermediate Statistics V.L. SAFONOV	69
--	----

2.2 Electron Spectroscopy

Oxygen K-Absorption Spectroscopy of $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ($x=0.0-0.5$), $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ ($\delta=0.0-0.7$), and $\text{Nd}_{2-y}\text{Ce}_y\text{CuO}_4$ ($y=0.0-0.2$) T. TAKAHASHI, H. MATSUYAMA, T. WATANABE, H. KATAYAMA-YOSHIDA, S. SATO, N. KOSUGI, A. YAGISHITA, S. SHAMOTO, M. SATO	75
Electron Energy Loss Spectroscopy in $\text{Ba}_2\text{YCu}_3\text{O}_7$ Superconductor K. SHIRAISHI, H. ITOH	79
EELS and XPS Study of $\text{Y}_{1-x}\text{Ca}_x\text{Ba}_2\text{Cu}_4\text{O}_8$ ($x=0\sim 0.1$) K. YOSHIMURA, Y. KODAMA, S. TANEMURA	83
Superconductivity and Electronic State of Nd-Ce-Cu-O System Y. YOKOYAMA, T. KATAYAMA, H. OYANAGI, Y. HASUMI, Y. NISHIHARA	87
Unoccupied Electronic Structure of $\text{Bi}_2\text{Sr}_2\text{Ca}_{1-x}\text{Y}_x\text{Cu}_2\text{O}_8$ Studied by Inverse Photoemission T. WATANABE, S. SUZUKI, T. TAKAHASHI, H. KATAYAMA-YOSHIDA, S. SATO	91
Photoemission Study of $\text{Bi}_2\text{Nd}_{0.5}\text{Ca}_{2.5}\text{Cu}_2\text{O}_y$ and $\text{Bi}_2(\text{La},\text{Pr})_{0.5}\text{Ca}_{2.5}\text{Cu}_2\text{O}_y$ Superconductors K. IKEDA, F. MUNAKATA, R. ITTI, T. KAWANO, H. YAMAUCHI, N. KOSHIZUKA	95
Photoelectron Spectroscopic Study of Zn/Cu Substituted $\text{La}_{1.85}\text{Sr}_{0.15}(\text{Cu}_{1-x}\text{Zn}_x)\text{O}_y$ R. ITTI, S. IKEGAWA, K. IKEDA, H. YAMAUCHI, N. KOSHIZUKA, S. TANAKA	99

2.3 Transport and Thermal Properties

The Physical Effect of Reduction on The Hall Effect and Superconducting Properties of $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_{4-\delta}$ N.A. FORTUNE, K. MURATA, M. ISHIBASHI, Y. YOKOYAMA, Y. NISHIHARA ...	105
Properties of the Cubic Superconductor $\text{Ba}_{0.6}\text{K}_{0.4}\text{BiO}_3$ N. SAVVIDES, R. WINN, C. ANDRIKIDIS, S.J. COLLOCOTT, K.-H. MÜLLER, E.R. VANCE	109
Preparation, Pressure Effect, and Structural Phase Transition in $\text{Ba}_{1-x}\text{K}_x\text{BiO}_3$ and $\text{Ba}_{1-x}\text{Rb}_x\text{BiO}_3$ A. IYO, A. YAMADA, Y. OJI, A. TAKAHASHI, A. INOUE, H. WATANABE, H. UWE, T. SAKUDO, K. MURATA	113
The Properties of Normal Carriers in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ T. HONMA, K. YAMAYA	117
Specific Heat of $\text{YBa}_2\text{Cu}_4\text{O}_8$ near T_c J.O. WILLIS, I. TOMENO, T. MIYATAKE, T. ITOH, K. TAI, N. KOSHIZUKA, S. TANAKA	121
Thermoelectric Power of T^* Phase and $(\text{L},\text{Ce})_4(\text{La},\text{Ba},\text{Sr})_4\text{Cu}_6\text{O}_{16+z}$ K. KUBO, S. IKEGAWA, K. MATSUURA, T. WADA, T. YAMASHITA, H. YAMAUCHI, S. TANAKA	125

Transport Properties of Pb-Based Superconducting Copper Oxides M. KOSUGE, K. SAKUYAMA, T. MAEDA, H. YAMAUCHI, N. KOSHIZUKA	129
Tunneling Measurements on $\text{YBa}_2\text{Cu}_4\text{O}_8$ under Magnetic Fields K. NAKAO, S. FUJITA, M. NEMOTO, K. SUZUKI, T. MIYATAKE, T. MORISHITA, N. KOSHIZUKA, S. TANAKA	133
Resistive Transition in Magnetic Field for Single Crystals of Tl-Ba-Ca-Cu-O System A. ENDO, S. NISHIKIDA	137
Pressure Effect on the Superconducting Transition Temperature of Tl-Based High- T_c Superconductor (2212) H. YOSHIDA, T. KANEKO, S. ABE, S. MIURA, S. NAKAJIMA, T. ATOU, M. KIKUCHI, Y. SYONO	141
Anisotropic Resistive State and Dissipation in Magnetic Fields in Layered Superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ K. KADOWAKI, J.N. LI, J.J.M. FRANSE	145

2.4 Magnetic Resonance and Mössbauer Studies

Phase Stability, Superconductivity and ^{151}Eu Mössbauer Effect in T^* -Phase $(\text{La}_{1-x}\text{Eu}_x)_{2-y}\text{Sr}_y\text{CuO}_4$ M. TANIWAKI, H. ITOH, M. KUSUHASHI	151
NMR Study in $\text{Tl}_2\text{Ba}_2\text{CuO}_{6-\delta}$ T. GOTO, T. SHINOHARA, T. SATO, T. FUKASE, S. NAKAJIMA, M. KIKUCHI, Y. SYONO	155
Copper Nuclear Relaxation Rate and Knight Shift in $\text{YBa}_2\text{Cu}_4\text{O}_8$ T. MACHI, I. TOMENO, T. MIYATAKE, N. KOSHIZUKA, T. IMAI, H. YASUOKA	159
Electron Spin Resonance Study of Paramagnetic Species Coexisted with the Fine Particles of the R-Ba-Cu-O (R=Y, Eu, Gd) Superconductors M. KAISE, H. KONDO, M. MIZUNO, C. NISHIHARA, H. NOZOYE, H. SHINDO	163
Microwave Absorption of Thin Films Formed by MOCVD Y. YAMADA, H. HAYASHI, Y. SHIOHARA, S. TANAKA	167
Correlation between T_c and Eu Lattice Vibration in $(\text{La}_{1-x}\text{Eu}_x)_{2-y}\text{Ce}_y\text{CuO}_{4-\delta}$ Observed by ^{151}Eu Mössbauer Effect H. ITOH, M. KUSUHASHI, M. TANIWAKI	171
Lattice Vibration in Aligned $\text{EuBa}_2(^{57}\text{Fe}_{0.01}\text{Cu}_{0.99})_3\text{O}_7$ Observed by Mössbauer Spectroscopy K. SHIRAMINE, T. MURAKI, M. TANIWAKI	175
Emission Mössbauer Spectra of Superconducting and Nonsuperconducting $\text{YBa}_2\text{Cu}_3\text{O}_y$ Doped with ^{57}Co S.S. YAKIMOV, V.M. CHEREPANOV, M.A. CHUEV, V.Y. GONCHAROV	179

2.5 Optical Properties

Electronic States of High- T_c Cuprates Investigated by Optical Measurements S. TAJIMA	185
Far Infrared Spectra of High T_c Cuprate Superconductor J. TANAKA, M. SHIMADA, M. SHIMIZU	191
Mid-IR Reflectivity of Single-Crystals $\text{Bi}_2\text{Sr}_2\text{CuO}_y$, $\text{Bi}_2\text{M}_{m+1}\text{Co}_m\text{O}_y$ ($M=\text{Ca}, \text{Sr}, \text{Ba}$; $m=1,2$), $\text{Bi}_2\text{Sr}_3\text{Fe}_2\text{O}_{9.2}$ and $\text{Bi}_2\text{Sr}_2\text{MnO}_{6.25}$ Y. WATANABE, N.P. ONG, D.C. TSUI, J.M. TARASCON	195
Far-Infrared Absorption by Bulk $\text{YBa}_2\text{Cu}_3\text{O}_{6.89}$ Superconductor E. KAWATE, A. ONAE, Y. NAKAZAWA, M. ISHIKAWA, Y. MIKI, M. OKAJI ...	199
Optical Properties of Single-Crystal $\text{YBa}_2\text{Cu}_3\text{O}_y$ Thin Films H. YASUOKA, H. MAZAKI, T. TERASHIMA, Y. BANDO	203
Raman Scattering from Spin-Pair Excitations in $\text{Pr}_{2-x}\text{Ce}_x\text{CuO}_{4-y}$, $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_{4-y}$ and $\text{Sm}_{2-x}\text{Ce}_x\text{CuO}_{4-y}$ I. TOMENO, M. YOSHIDA, K. IKEDA, K. TAI, K. TAKAMUKU, N. KOSHIZUKA, K. OKA, H. UNOKI	207
Infrared Absorption in Single Crystals of Bi-Sr-(Ca)-Cu-O System Y. HAYASHI, Y. HARADA, N. FUKUOKA, S. NAKANISHI	211
Phonons in $(\text{Sm}, \text{Ce})_2(\text{Ba}, \text{Sm})_2\text{Cu}_3\text{O}_x$ M. YOSHIDA, S. TAJIMA, Y. MIZUO, T. WADA, Y. YAEGASHI, A. ICHINOSE, N. KOSHIZUKA	215
Contribution of Itinerant Electrons to Optical Anomalies in the Normal State of Oxide Superconductors S. TANAKA	219

2.6 Magnetic Properties

Inelastic Neutron Scattering Study of Spin Dynamics in $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$ C. VETTER, P. BURLET, L.P. REGNAULT, J.R. MIGNOD, J.Y. HENRY, G. LAPERTOT	225
de Haas-van Alphen Effect in YBCO J.L. SMITH, C.M. FOWLER, B.L. FREEMAN, W.L. HULTS, J.C. KING, F.M. MUELLER	231
de Haas-van Alphen Measurement in $\text{YBa}_2\text{Cu}_3\text{O}_7$ G. KIDO, K. KOMORITA, H. KATAYAMA-YOSHIDA, T. TAKAHASHI, Y. KITAOKA, K. ISHIDA, T. YOSHITOMI	237
Possibility of the Carrier Doping in a Ferromagnetic Copper Oxide: $\text{La}_4\text{Ba}_2\text{Cu}_2\text{O}_{10}$ H. MASUDA, F. MIZUNO, I. HIRABAYASHI, S. TANAKA	241
Magnetic Anisotropy of Single Crystalline $\text{La}_4\text{Ba}_2\text{Cu}_2\text{O}_{10}$ Ferromagnet F. MIZUNO, H. MASUDA, I. HIRABAYASHI	245
Critical Fields of Anisotropic Superconductor Nb_3S_4 H. OKAMOTO, Y. ISHIHARA, K. TSUTSUMI	249
Magnetic and Transport Properties of the $\text{Ba}(\text{V}, \text{M})\text{S}_3$ [$\text{M}=\text{Ti}, \text{Nb}$] Systems K. MATSUURA, T. WADA, T. NAKAMIZO, H. YAMAUCHI, S. TANAKA	253

3 Chemistry

3.1 Material Synthesis

Superconducting Lead Cuprates Synthesized in Oxidizing Atmosphere T. MAEDA, K. SAKUYAMA, H. YAMAUCHI, S. TANAKA	261
Uniaxial Stress Effect on the Superconductivity of Grain-Oriented Samples of High T_c Superconductors Y. MOTOI, K. FUJIMOTO, H. UWE, T. SAKUDO	265
Superconductivity of $\text{Ln}_{1.85-x}\text{La}_x\text{Ce}_{0.15}\text{CuO}_4$ ($\text{Ln}=\text{Pr}, \text{Sm}$) A. ITO, H. IWASAKI, N. KOBAYASHI	267
HIP-Processed Superconducting $\text{La}_{2-x}\text{Sr}_x\text{CaCu}_2\text{O}_6$ T. SAKURAI, T. YAMASHITA, H. YAMAUCHI, S. TANAKA	271
Processing of $\text{YBa}_2\text{Cu}_3\text{O}_x$ Ceramic Materials: Effect of Additives A.S. RAO, L. APRIGLIANO, O.P. ARORA	275
Microstructure and AC-Susceptibility of $(\text{Y}, \text{Ca})\text{Ba}_2\text{Cu}_4\text{O}_8$ Superconductors Prepared at Low (3 atm) and High (400 atm) Oxygen Pressure N. SUZUKI, T. WADA, A. ICHINOSE, Y. YAEGASHI, H. YAMAUCHI	279
Effects of Water and Organic Solvents on the Bi-Pb-Sr-Ca-Cu-O System K. HOTTA, H. MAGOME, Y. SUGIYAMA, T. SUZUKI, H. HIROSE	283
Effect of Particle Size in Raw Material CuO on Superconductivity of HTSC S. YOSHIZAWA, M. YANAGAWA, S. HASEYAMA, K. KAWAZU, Y. ITO	287
Synthesis and Physical Properties of $(\text{Tl}_{1-x}\text{Pb}_x)\text{Sr}_2\text{CuO}_z$ ($z \sim 5$) T. KANEKO, A. ICHINOSE, T. WADA, K. HAMADA, H. YAMAUCHI, S. TANAKA	291
Synthesis and Characterization of $(\text{Pb}/\text{Cu})\text{SrLaCuO}_y$ S. ADACHI, K. SETSUNE, K. WASA	295
Syntheses and Characterization of Superconducting Lead Cuprates, $(\text{Pb}, \text{Cu})(\text{Ln}, \text{Ce})_2(\text{Sr}, \text{Ln})_2\text{Cu}_2\text{O}_9$ (Ln : Rare-Earth Element) K. SAKUYAMA, T. MAEDA, H. YAMAUCHI	299
Preparation of Pb-Sr-Ca-Y-Cu-O Superconductors from Oxalate Precursors T. IKEMACHI, T. KAWANO, S. KORIYAMA, H. YAMAUCHI	303
Crystal Structure and Superconductivity of New Pb Families with (Pb, Cu) Double Layer — $\text{Pb}(\text{Ba}, \text{Sr})_2(\text{Y}, \text{Ca})\text{Cu}_3\text{O}_y$ and $\text{Pb}(\text{Ba}, \text{Sr})_2(\text{Eu}, \text{Ce})_2\text{Cu}_3\text{O}_y$ A. TOKIWA, Y. SYONO, T. OKU, M. NAGOSHI, N. KOBAYASHI, M. KIKUCHI, K. HIRAGA	307
Crystal Structures and Physical Properties of Layered Perovskite Compounds $\text{Sr}_{n+1}\text{V}_n\text{O}_{3n+1-\delta}$ ($n=1, 2, 3$ and ∞) N. SUZUKI, T. NORITAKE, N. YAMAMOTO, T. HIOKI	311
New Layered Perovskite Compounds, $\text{Sr}_{n+1}\text{V}_n\text{O}_{3n+1}$ ($n=1, 2, 3$ and ∞) A. NOZAKI, H. YOSHIKAWA, T. WADA, H. YAMAUCHI	315

Possible New Ternary Chalcogenide Superconductors with Composite Crystal Structure Y. OOSAWA, Y. GOTOH, J. AKIMOTO	319
A New Ambient-Pressure Organic Superconductor, κ -(BEDT-TTF) ₂ Ag(CN) ₂ H ₂ O H. MORI, I. HIRABAYASHI, S. TANAKA, T. MORI, Y. MARUYAMA, H. INOKUCHI	323
New Layered Copper Oxides Containing Double-MO ₂ -Unit Fluorite Block T. WADA, A. ICHINOSE, H. YAMAUCHI, S. TANAKA	327
Superconductivity up to 127 K in Tl-Ba-Ca-Cu-O Ceramics S. ADACHI, K. MIZUNO, K. SETSUNE, K. WASA	331
3.2 Structural Analysis	
Phase Instability at the Maximum T _c in Oxide Superconductors: Phase Separation in La ₂ CuO _{4+x} , Nd _{2-x} Ce _x CuO ₄ , and La _{2-x} Sr _x CuO ₄ J.D. JORGENSEN, P. LIGHTFOOT, S. PEI, B. DABROWSKI, D.R. RICHARDS, D.G. HINKS	337
High-Resolution Neutron Powder Diffraction of Superconducting La ₂ CuO _{4+δ} T. KAMIYAMA, H. ASANO, K. SHIBUTANI, R. OGAWA, Y. ENDOH, F. IZUMI, W.I.F. DAVID, R. IBBERSON, Y. YAMAGUCHI	343
Crystal Structure of the Ferromagnetic Copper Oxide La _{4-x} Ba _{2+x} Cu ₂ O ₁₀ T. MOCHIKU, H. ASANO, F. MIZUNO, H. MASUDA, I. HIRABAYASHI, S. TANAKA, F. IZUMI	347
Microstructure of Domain/Twin Intersections in Single Crystal YBa ₂ Cu ₃ O _{7-d} K.N.R. TAYLOR, A.N. KHORASANI, M.I. DARBY, Y. FENG, I.R. JONES, M. INDRO, G.J. RUSSELL	351
TEM Observation of Microstructure in Sintered YBa ₂ Cu ₃ O _{7-x} T. YOSHINO, Y. TOMOKIYO, Y. SUYAMA	355
Microstructures in (Y _{1-x} Ca _x)Ba ₂ Cu ₄ O ₈ Prepared at Low and High Oxygen Partial Pressure K. YAMAGUCHI, T. MIYATAKE, T. WADA, N. SUZUKI, T. TAKATA, H. YAMAUCHI, N. KOSHIZUKA	359
X-ray Diffraction Study on 2201 Tl-Oxide Single-Crystals T. KAJITANI, K. HIRAGA, S. NAKAJIMA, M. KIKUCHI, Y. SYONO	363
High-Resolution Electron Microscopy of Tl-Ba-Ca-Cu-O Superconductors T. OKU, K. HIRAGA, D. SHINDO, M. KUKUCHI, S. NAKAJIMA, Y. SYONO	367
X-Ray Rietveld Refinement of Orthorhombic and Tetragonal (Tl,Pb)Sr ₂ CuO _{5-z} A. ICHINOSE, T. KANEKO, T. WADA, K. HAMADA, A. NARA, H. YAMAUCHI	371

3.3 Substitution and Doping Effects

Effects of Disorder and Carrier Density on the Superconductivity in Oxide Systems W.Y. LIANG	377
Anion Substitution Effects in Nd_2CuO_4 and $\text{La}_{1.7}\text{Sr}_{0.3}\text{CuO}_4$ J. SUGIYAMA, Y. OJIMA, H. YAMAUCHI	383
Possibility of Substitution of Sn for Cu in High- T_c Superconductors — Solubility of Sn in CuO T. MURAKI, K. SHIRAMINE, M. TANIWAKI, K. MUKASA	387
Effect of Oxygen Deficiency on the Superconducting Properties of YBCO Y. SUYAMA, M. MATSUMOTO, S. KAGEYAMA, I. SATO	391
1-2-3 Superconductors with High Hole Density Y. YAEGASHI, T. WADA, N. SUZUKI, A. ICHINOSE, H. YAMAUCHI	395
Superconductivity in Ni Substituted $\text{YBa}_2\text{Cu}_4\text{O}_8$ Y. KODAMA, Y. YAMADA, N. MURAYAMA, M. AWANO, T. MATSUMOTO	399
Superconductive Property of the Bi 2201 Phase S. KAMBE, Y. MURAKOSHI, M. KAWAI, T. KAWAI	403
Oxygen Loss from $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ by Annealing in Vacuum M. NAGOSHI, Y. FUKUDA, A. TOKIWA, J. MURATA, N. SANADA, T. SUZUKI, Y. SYONO, M. TACHIKI	407
The Effect of Oxygen Content on the Properties and Structure of the Low T_c Phase in Bi-Sr-Ca-Cu-O Superconductors S. KOBAYASHI	411
Li Substitution of $\text{Bi}_2\text{Sr}_2\text{Ca}_{n-1}(\text{Cu}_{1-x}\text{Li}_x)_n\text{O}_{2n+4}$ ($n=1,2$) T. HORIUCHI, T. KAWAI, S. KAWAI, K. OGURA	415
Comparative Study of the Superconductivity of $\text{Tl}_2\text{Ba}_2\text{CuO}_w$ and $\text{Bi}_2\text{Sr}_2\text{CuO}_y$ M. KIKUCHI, H. NAMEKI, S. NAKAJIMA, A. TOKIWA, Y. SYONO, N. KOBAYASHI	419
Superconductivity of $\text{TlBa}_2\text{Ca}_{n-1}\text{Cu}_n\text{O}_y$ System in Over-Doping State S. NAKAJIMA, M. KIKUCHI, Y. SYONO, K. NAGASE, N. KOBAYASHI	423
Structure and Superconducting Properties of $\text{Bi}_{2-x}\text{Pb}_x\text{Sr}_2\text{Ca}_{1-y}\text{Y}_y\text{Cu}_2\text{O}_{8+d}$ N. FUKUSHIMA, H. NIU, K. ANDO	427
Superconducting Properties in Alkali Element Doped $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ S.X. DOU, H.K. LIU, W.M. WU, W.X. WANG, C.C. SORRELL, R. WINN, N. SAVVIDES	431

3.4 Phase Diagrams

Phase Diagram of Y-Ba-Cu-O System W. ZHANG, K. OSAMURA	437
Phase Diagram of Bi-based Superconductors (2) A. NAKAMURA, T. IZUMI, Y. SHIOHARA	441

A Study of the Temperature Dependence of the Heat Capacity in a High T_c Superconductor $\text{HoBa}_2\text{Cu}_3\text{O}_y$ Single Crystal K. TSUTSUMI, H. OKAMOTO, Y. ISHIHARA, T. TAMURA, K. KITAZAWA	445
--	-----

Study of the Structural Phase Diagram, Oxygen Bulk In-Diffusion, and Equilibrium Partial Pressure of $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$ N.H. ANDERSEN, B. LEBECH, H.F. POULSEN	449
---	-----

3.5 Crystal Growth

Growth and Superconductive Properties of La_2CuO_4 Single Crystals I. TANAKA, H. TAKAHASHI, H. KOJIMA	455
--	-----

Growth and Structure of $(\text{Tl,Bi,Pb})\text{Sr}_2\text{CaCu}_2\text{O}_x$ Single Crystal T. KOTANI, Y. UEBA, H. TAKEI, K. TADA, M. KAWASHIMA	459
---	-----

4 Flux Pinning

4.1 Flux Pinning Properties

Pinning by Oxygen Point Defects in Proton-Irradiated $\text{Ba}_2\text{YCu}_3\text{O}_{7-\delta}$ R.B. VAN DOVER, E.M. GYORGY, A.E. WHITE, L.F. SCHNEEMEYER, R.M. FLEMING, R.J. FELDER, J.V. WASZCZAK	467
---	-----

Flux Pinning in CVD Processed YBaCuO Film K. WATANABE, S. AWAJI, N. KOBAYASHI, H. YAMANE, T. HIRAI, Y. MUTO, T. YAMASHITA	473
--	-----

Irreversibility Temperatures in Oxide and Metallic Superconductors M. SUENAGA, A.K. GHOSH, Y. XU, D.O. WELCH	479
---	-----

Properties of Single Phase 2223-Bi Cuprates: Substitution Effect of Ln for Ca R. YOSHIKAWA, H. IKEDA, M. WATAHIKI, K. YOSHIKAWA, N. TOMITA	483
--	-----

Heat Treating Condition Dependence of J_c -B Characteristics for Silver Sheathed $\text{Y}_{1-x}\text{Ca}_x\text{Ba}_2\text{Cu}_3\text{O}_8$ Superconductors K. SHIBUTANI, S. HAYASHI, R. OGAWA, Y. KAWATE	487
--	-----

Distribution of Pinning Energies in Oxide Superconducting Thin Films and Single-Crystalline Powders K. KAWAGUCHI, I. TAGO, M. NAKAO	491
---	-----

Temperature Dependence of the J_c -B Characteristics of $\text{Bi}_{2.2}\text{Sr}_{1.8}\text{Ca}_{1.0}\text{Cu}_{2.0}\text{O}_{8.2}$ Single Crystal S. HAYASHI, K. SHIBUTANI, I. SHIGAKI, Y. FUKUMOTO, H. KIKAWA, R. OGAWA, Y. KAWATE, V. MARET, K. KITAHAMA, S. KAWAI	495
---	-----

Critical Current Density $j_c(H,T)$ and Current Voltage Characteristic in Sintered and Melt Processed Ceramics of Y-, Bi, and Tl- Based Superconductors W. PAUL, TH. BAUMANN, H. DERSCH, F. STUCKI, J. RHYNER, J. BLATTER ...	499
--	-----

Pinning Characteristics and Their Anisotropy in a MPMG-Prepared High- T_c Oxide Superconductor B. NI, K. YAMAFUJI, N. MORI, K. ÔGI, T. MATSUSHITA, K. FUNAKI	503
--	-----

Pinning Characteristics in Superconducting Bi-Pb-Sr-Ca-Cu-O T. UMEMURA, K. EGAWA, M. WAKATA, S. UTSUNOMIYA, B. NI, M. TAKEO, K. YAMAFUJI, E.S. OTABE, T. MATSUSHITA	507
History Effect of Critical Current Density in Superconducting Bi-Pb-Sr-Ca-Cu-O Wires T. HIKATA, K. SATO, B. NI, E.S. OTABE, T. MATSUSHITA, M. TAKEO, K. YAMAFUJI	511
J_c and J_c -B Enhancement with Micro Structure Improvement of Bi-Based High- T_c Superconductor T. HIKATA, M. UHEYAMA, H. MUKAI, N. SHIBUTA, T. KATO, K. SATO	515
Magnetization Properties of YBCO Prepared by MPMG Process H. FUJIMOTO, M. MURAKAMI, S. GOTOH, N. KOSHIZUKA	519
Enhancement of Critical Current Density of $Ba_2YCu_3O_y$ by 28 MeV Electron Irradiation T. TERAJ, T. MASEGI, Y. TAKAHASHI, K. KISHIO, K. NAKATANI, Y. ENOMOTO, S. KUBO	523
Changes of Superconductivity and Crystal Structure on $Ba_2YCu_3O_y$ by Ion Irradiation T. TERAJ, T. FURUTA, T. MASEGI, K. KUSAGAYA, Y. TAKAHASHI, Y. ENOMOTO, S. KUBO	527
Critical Current Density and Microstructure of $YBa_2Cu_4O_8$ T. MIYATAKE, K. YAMAGUCHI, T. WADA, N. SUZUKI, H. YAMAUCHI, N. KOSHIZUKA	531
Microstructure and Flux Creep Behavior of Ag-Sheathed Bi-Pb-Sr-Ca-Cu-O Tapes K. YAMAMOTO, S. MURASE, S. TAKENO, S. NAKAMURA	535
Texture Study of Pressed $YBa_2Cu_3O_{7-x}$ Polycrystals by Electron Channeling Patterns W.J. KANG, S. HANADA, K. YOSHIMI, S. SAITO, Y. MURAYAMA, S. HAYASHI, A. NAGATA	539
3000 A cm^{-2} Thick Film YBCO: Preparation and Flux Pinning Characteristics K.N.R. TAYLOR, A. BAILEY, D.N. MATTHEWS, G.J. RUSSELL	543
Limiting Factors of Critical Current for Bi-Pb-Sr-Ca-Cu-O Oxide Superconductor T. KANAI, T. KAMO, S. MATSUDA	547
Anisotropy of the Critical Current in Layered Superconductor T. YAMAGUCHI, S. AOKI, K. ONABE, N. FUTAKI, N. SADAKATA, O. KOHNO, S. NAKANO, Y. KUWASAWA	551
Angular Dependence of Magnetic Field on Critical Current Density in $Tl_2Ba_2Ca_2Cu_3O_x$ Thin Film T. NABATAME, Y. SAITO, K. AIHARA, T. KAMO, S. MATSUDA	555
Critical Currents of (103)- and (001)-Oriented Y-Ba-Cu-O Thin Films S. KUBO, Y. ENOMOTO, T. IWATA	559

Anisotropy in Magnetization and Critical Current Density of La-Sr-Cu-O Single Crystal K.KISHIO, K. NAKATANI, K. KITAZAWA, I. TANAKA, H. KOJIMA, K. YAMAFUJI	563
--	-----

4.2 Flux Line Lattice and Flux Distribution

Dynamical Magnetic Flux Behavior in High-T _c Oxide Superconductors S. GOTOH, N. KOSHIZUKA, M. YOSHIDA, H. FUJIMOTO, M. MURAKAMI	569
ESR of DPPH as a Probe of Magnetic Flux Fluctuations on the Surface of YBaCuO Made by the MPMG Method K. SUGAWARA, T. OYAMA, M. MURAKAMI, K. YASUIKE, Y. SHIOHARA, S. TANAKA	573
Size Effects in the Magnetization of Epitaxial YBa ₂ Cu ₃ O _x Films S. KOSAKA, H. OBARA, M. UMEDA, Y. KIMURA, H. YAMANE, T. HIRAI, H. KUROSAWA	577

4.3 Electromagnetic Properties

Ac Susceptibility of High-Temperature Ceramic Superconductors: Critical State and Creep at Grain Boundaries and in Grains K.-H. MÜLLER, M. NIKOLO, N. SAVVIDES, R. DRIVER	583
Flux Pinning Studies for Plasma-Sprayed YBa ₂ Cu ₃ O _{7-x} Superconductors T.R. FINLAYSON, Y.C. FAYMAN, D.B. LOWE, Z. PRZELOZNY, T.F. SMITH	587
Magnetic Shielding Effect of Bi Oxide Superconducting Vessels with a SQUID A. KOIKE, K. HOSHINO, H. OHTA, E. SUDOH, K. NUMATA, K. KATO, S. YAMAZAKI, H. TAKAHARA, M. AONO	591
Theory of AC Loss of High-T _c Superconductors in Flux-Flow State Y. ANDO, S. AKITA	595
Current Limiting Resistance Characteristics of High-T _c Superconductor Y. ITO, K. NAKAMURA, Y. ABE, M. SONE	599

5 Tape and Bulk

5.1 Wires and Tapes

Properties of Ag/Bi-Based Superconducting Long Wire and Test Coil H. MUKAI, N. SHIBUTA, T. MASUDA, T. HIKATA, M. UHEYAMA, T. KATO, K. SATO	607
Recent Developments in BiSrCaCuO Based Wires and Tapes H. KRAUTH, K. HEINE, J. TENBRINK, M. WILHELM, H.-W. NEUMÜLLER	613
Processing and Properties of BiSrCaCuO Superconducting Tapes K. TOGANO, H. KUMAKURA, D.R. DIETDERICH, H. MAEDA, J. KASE, K. NOMURA	619
The Transport Critical Current Properties of BSCCO Superconducting Wires N. ENOMOTO	625

Preparation of Bi-Sr-Ca-Cu-O Superconducting Tape by Laser Zone Melting Method K. TOMOMATSU, A. KUME, N. SADAKATA, O. KOHNO, T. HARA, K. OKANIWA, T. YAMAMOTO	631
Tl-2212 Films Prepared on Flexible YSZ Tape by Ion Beam Sputtering Y. SAITO, R. NISHIWAKI, T. MATSUMOTO, T. KAMO, R. SHIOBARA	635
Properties of TL-2223 Superconducting Thick Films Formed by Plasma Spraying Y. YOSHIDA, T. KANAI, T. KAMO, T. MATSUMOTO, R. SHIOBARA	639
Preparation of Superconducting Thick Films of Bi-Pb-Sr-Ca-Cu-O by Gas Deposition of Fine Powder S. KASHU, M. KAITOU, K. HATANAKA, C. HAYASHI	643
Superconducting YBCO Film on Ag Tape Using ICB Deposition H. YOSHINO, M. YAMAZAKI, H. FUKE, T.D. THANH, K. ANDO, Y. KOBAYASHI	647
Composition Dependence of Critical Current Density in Ag Sheathed Bi-Pb-Sr-Ca-Cu-O Tapes S.S. OH, K. OSAMURA, S. OCHIAI	651
Properties of Silver Sheathed Superconducting Wires H. KIKUCHI, N. UNO, Y. TANAKA, T. HARA, K. OKANIWA, T. YAMAMOTO	655
Electromagnetic Properties and Detailed Preparation Methods of Ag-sheathed Bi-Pb-Sr-Ca-Cu-O Superconducting Tapes K. YAMAMOTO, J. KAI, M. HIRAOKA	659
Superconducting Properties of Hot-Pressed Bi-Pb-Sr-Ca-Cu-O Thick Films N. MURAYAMA, Y. HIRAMATSU, Y. TORII	663
Preparation of High J_c Y-Ba-Cu-O Thick Films by a Paint-on Method M. MIYAJIMA, S. NAGAYA, I. HIRABAYASHI, S. TANAKA	667
Preparation of Bi-Sr-Ca-Cu-O Superconducting Fibers by Laser Pedestal Growth Method K. HAYASHI, H. NONOYAMA, M. NAGATA, K. TAKAHASHI	671
10M Long Silver Sheathed Tl-Ba/Sr-Ca-Cu-O Superconducting Tapes F. HOSONO, A. NOMOTO, T. UMEZAWA, M. SEIDO, T. MATSUMOTO, K. AIHARA	675
AC Power Loss Characteristics of Ag-Sheathed High- T_c Superconducting Tapes T. SASAOKA, M. KANAOKA, Y. SEKII, S. HOSONO, M. SEIDO	679
Superconductor/Silver Composites and Tapes Based on Bi-Pb-Sr-Ca-Cu-O N. SAVVIDES, S.X. DOU, K.-H SONG, H.K. LIU, C.C. SORRELL	683
Preparation of Bi-Pb-Sr-Ca-Cu-O Wires/Tapes by Partial-Melt Mediated Process D.Y. JEONG, D.W. HA, M.H. SOHN, K.S. RYU, M.S. YUN, S.B. BYON, U. AHN	687

Possibility of Manufacturing Superconductive Film by Laser Treatment of Plasma Sprayed Oxide Ceramic Layer H. MIYAZAWA, K. HOTTA, S. WATANABE, S. MIYAKE, H. HIROSE, M. MURAKAWA	691
Preparation of Superconducting Oxide Films by Sol-Gel Method A. OKUHARA, M. HIRAOKA, Y. TAKADA	695
Atmosphere Control During Preparation of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Magnet Windings R.B. POEPEL, S.E. DORRIS, J.J. PICCIOLO, U. BALACHANDRAN, M.T. LANGAN, C.Z. ZHANG, K. MERKLE, Y. GAO, J.T. DUSEK	699
Suspension-Spun High- T_c Oxide Superconducting Filament with High J_c T. GOTO, C. YAMAOKA, Y. KINO, S. IWATA, K. KOJIMA	703

5.2 Bulk Materials

Critical Current Characterization of Melt-Processed $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ H. KÜPFER, C. KELLER, A. GUREVICH, K. SALAMA, V. SELVAMANICKAM	709
Preparation and Properties of Large Bulk YBCO Superconductor Quench and Melt Growth (QMG) Process K. SAWANO, M. MORITA, M. TANAKA, K. KIMURA, S. TAKEBAYASHI, M. KIMURA, K. MIYAMOTO	715
QMG Processed Materials with High J_c and Their Mechanism M. TANAKA, M. MORITA, S. TAKEBAYASHI, M. KIMURA, K. KIMURA, M. SUGIYAMA, K. MIYAMOTO, K. SAWANO	721
Quench and Melt Growth (QMG) Processed Superconducting Materials for Levitation and Magnetic Flux Trapping K. MIYAMOTO, M. MORITA, M. TANAKA, S. TAKEBAYASHI, K. KIMURA, M. KIMURA, K. SAWANO	727
Quench and Melt-Growth (QMG) Process for Large Bulk Superconductor Fabrication M. MORITA, S. TAKEBAYASHI, M. TANAKA, K. KIMURA, K. MIYAMOTO, K. SAWANO	733
Improvement of Critical Current Density by Addition of Other Elements in $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$ Superconductor K. OSAMURA, Y. KUSUMOTO, S. OCHIAI	737
Preparation of Bi-Based Superconducting Rods by Melt-Quenching and Floating Zone Method K. SAWADA, M. HIRAOKA, T. KOMATSU, K. MATUSITA	741
A Successful Control Processing for Composite Particles of Oxide Superconductor Y. TAKAO, M. AWANO, H. TAKAGI	745
Preparation of Fine Particles Composed of Y System Oxide by Mist Pyrolysis Method M. AYABE, R. TATSUGAE, H. NISHIKAWA, C. FUKUOKA	749

Large Levitation Force Due to Flux Pinning in MPMG Processed YBaCuO Superconductors with Ag Doping M. MURAKAMI, T. OYAMA, H. FUJIMOTO, T. TAGUCHI, S. GOTOH, Y. SHIOHARA, N. KOSHIZUKA, S. TANAKA	753
New Melt Process of High- T_c Oxide Superconductor by a Rapid Solidification Using a Nd-YAG Laser S. NAGAYA, M. MIYAJIMA, I. HIRABAYASHI, Y. SHIOHARA, S. TANAKA	757
Preparation of High J_c Y-123 by Addition of Reactive Fine Powders T. SAKAI, K. NISHIO, N. OGAWA, I. HIRABAYASHI	761
Highly Orientated Growth of YBCO Superconductors by Partial Melt Process N. OGAWA, K. NISHIO, T. SAKAI, I. HIRABAYASHI	765
Laser Zone Melting of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{Li}_{0.5}\text{Al}_y\text{O}_x$ Superconductors K. ISHIGE, T. SUGA, Y. SHIOHARA	769
Crystal Growth of Oxide Superconductors Prepared by the Bridgman Method T. IZUMI, Y. SHIOHARA	773
Superconducting Textured Crystal Produced by a Partial Melt Process T. NODA, Y. SHIOHARA	777
Preparation Conditions of 80K-Phase Bi (Pb)-Sr-Ca-Cu-O Single Crystals W. FUTO, S. KISHIDA, H. TOKUTAKA, M. CHIHAYA, K. NISHIMORI, N. ISHIHARA	781
Preparation and Properties of the High- T_c $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$ Whiskers and Crystals I. MATSUBARA, H. TANIGAWA, T. OGURA, H. YAMASHITA, M. KINOSHITA, T. KAWAI	785
Preparation of High Magnetization YBaCuO Bulk Superconductor by Quasi-melt Process H.G. LEE, S.C. KWON, H.J. LEE, J.C. LEE, I.S. CHANG, C.S. RIM, C.J. KIM, D.Y. WON	789
Preparation of YBaCuO Thick Film on (001) MgO Single Crystal by the Peritectic Reaction C.J. KIM, H.J. LEE, C.S. RIM, I.S. CHANG, H.G. LEE, G.W. HONG, D.Y. WON	793
The Impact of Oxygen on Melt Processing of Bi-HT Superconductors J. BOCK, S. ELSCHNER, E. PREISLER	797
Performance of Current Lead of YBaCuO Bulk in Solid Conduction Cooling System H. YAMAMOTO, M. SANO, S. OZAWA, M. TANAKA, Y. MATSUBARA, T. OGASAWARA	801
High Temperature Deformation and Textures in Oxide Superconductors K. HIGASHIDA, N. NARITA	805
Effects of Melting Temperature on the Properties of High- T_c Superconducting $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ Glass-Ceramics W.-H. LEE, H. HOSONO, Y. ABE	809

5.3 Others

Evaluation of AC Loss in High- T_c Superconductors for Power Cable Application M. NAKADE, T. HARA, T. YAMAMOTO, H. HOSHINO, S. TANAKA, N. ICHIYANAGI, Z. IWATA	815
Influence of Contact Resistance on I_c Measurement of Bi Based Oxide Superconductor K. TAKAHASHI, Y. KAMISADA, T. OGAWA, K. MICHISHITA, Y. IKUHARA, T. TSUNOOKA, Y. KUBO	819
Low Surface Resistance of Ag-Added $YBa_2Cu_3O_{7-x}$ Ceramics O. ISHII, M. SENDA, T. KONAKA, M. SATO	823
Contact Resistance in BiPbSrCaCuO Superconducting Rods K. NUMATA, K. HOSHINO, H. TAKAHARA	827
Magnetic Separation of High- T_c Superconducting Particles E. OBA, H. MIYAJIMA, Y. ISHIKAWA, S. YOSHIZAWA	831
Pole Figure Analysis of Aligned High- T_c Superconductors Using Low-Indexed X-Ray Diffraction M. NAKAGAWA, Y. SHIOHARA, S. TANAKA	835
Angular Dependence of Critical Current Density of High- T_c BiPbSrCaCuO Superconductor K. ISAWA, C. TAKAHASHI, S. OGOTA, M. NAGANO, H. TAKAHASHI, K. HAMADA, S. KAMADA, K. SUGAWARA, A. NAGATA	839
Superconducting Current Lead Development of BiPbSrCaCuO K. TASAKI, E.S. YONEDA, D. ITO, H. OGIWARA, K. NUMATA, K. HOSHINO	843

6 Preparation and Properties of Thin Films

6.1 YBCO and Related Films

Rheed Oscillations During Growth of High- T_c Superconducting Oxides T. TERASHIMA, K. SHIMURA, Y. BANDO, K. IJIMA, K. YAMAMOTO, K. HIRATA, K. HAYASHI, K. KAMIGAKI, H. TERAUCHI	851
Low Temperature In Situ Growth of YBCO High- T_c Superconducting Thin Films Using MOCVD and Plasma-Enhanced MOCVD (PE-MOCVD) J. ZHAO, Y.Q. LI, C.S. CHERN, W. HUANG, P. NORRIS, B. GALLOIS, B. KEAR, P. LU, F. COSANDEY	857
In Situ Preparation of High- T_c Thin Films by Co-Evaporation Using Ozone Vapor Oxidation D.D. BERKLEY	863
Low Temperature Growth of YBCO Films by Plasma Assisted Vapor Deposition K. KANEHORI, A. TSUKAMOTO, N. SUGII	869
Uniform, Large Area Deposition of Superconducting Y-Ba-Cu-O Thin Films by Single Cathode Magnetron Sputtering K. ISHIBASHI, K. HIRATA, N. HOSOKAWA, Y. SHIRAKAWA, Y. YAMAMOTO	873

Preparation and Characterization of $(Y, Gd)_1Ba_2Cu_3O_x$ Thin Films S. FUJINO, T. SUGIHARA, T. TAKESHITA	877
Superconducting YBCO Thin Films with (013) and (103) Orientation K. TSUDA, Y. OKAMURA, T. SUZUKI, T. MATSUI, M. NAGANO, K. MUKAE ..	881
Low Temperature Synthesis of Cu, Y-Cu, Ba-Cu Oxide Film by Reactive Sputtering T. NAKAMURA, Y. MORIKAWA, H. YAMAOTO	885
Angular Dependence of Critical Current Density of YBaCuO Thin Film S. OGOTA, C. TAKAHASHI, K. ISAWA, M. NAGANO, H. TAKAHASHI, H. MORITA, M. SUZUKI	889
Epitaxial Growth of Superconducting $YBa_2Cu_3O_{7-x}$ Films by the RF Sputtering Method with the Cylindrical Substrate Holder H. KAJIKAWA, Y. FUKUMOTO, K. SHIBUTANI, S. HAYASHI, R. OGAWA, Y. KAWATE	893
Preparation of Y-Ba-Cu-O Films by ECR Plasma-Assisted Sputtering T. FUJII, T. ANNO, K. FURUSHO, T. KOYANAGI, K. MOROFUJI, K. MATSUBARA	897
Y-Ba-Cu-O Films Grown on Flexible Polycrystalline Substrates by Excimer Laser Ablation N. YOSHIDA, M. KUBOTA, S. OKUDA, S. TAKANO, M. NAGATA, T. HARA, K. OKANIWA, T. YAMAMOTO	901
Superconducting Properties of YBCO Prepared by Laser Ablation K. ONABE, Y. IJIMA, N. FUTAKI, N. SADAKATA, O. KOHNO, Y. IKENO	905
Hetero-Epitaxial Growth of MgO/YBCO Thin Films by Excimer Laser Deposition M. MATSUI, K. YAMAMOTO, M. NAKAJIMA, K. DOI, T. KOBAYASHI	909
Preparation of YBCO Thin Films by Plasma Assisted Pulsed Laser Deposition K. OHATA, T. SAWADA, H. IZUMI, K. SUZUKI, T. MORISHITA, S. TANAKA	913
Superconducting Properties of $YBa_2Cu_3O_x$ Films on Y_2O_3 Single Crystal A. OISHI, H. TESHIMA, H. IZUMI, K. OHATA, S. KAWAMOTO, T. MORISHITA, S. TANAKA	917
Structure of High- T_c Superconducting Thin Film by Laser Ablation T. NAGAISHI, H. ITOZAKI, T. MATSUURA, N. OTA, N. FUJIMORI, S. YAZU	921
Ultrathin $YBa_2Cu_3O_x$ Films on Lattice Matched $NdGaO_3$ Substrates M. MUKAIDA, S. MIYAZAWA, M. SASAURA	925
New Substrate $PrGaO_3$ for High- T_c Superconducting $YBa_2Cu_3O_x$ Epitaxial Film M. SASAURA, M. MUKAIDA, S. MIYAZAWA	929
Development of a Four-Source EB Gun for High- T_c Superconductor Film Deposition H. YAMAMOTO, T. KIKUCHI, N. OHSAKO	933
Oxygen Content Dependencies of Superconducting and Normal State Properties in Epitaxially Grown $YBa_2Cu_3O_x$ ($X=6-7$) Thin Films M. OHKUBO, T. HIOKI, T. KACHI	937

Preparation and Superconductive Properties of $\text{YBa}_2\text{Cu}_3\text{O}_y/\text{PrBa}_2\text{Cu}_3\text{O}_y$ Layered Structure H. OBARA, S. KOSAKA, Y. KIMURA	941
Application of NO_2 Supersonic Molecular Beam to Oxide Superconductor Fabrication in MBE H. NONAKA, T. SHIMIZU, K. ARAI	945
Preparation of Y-Ba-Cu-O Films by Activated Reactive Evaporation Y. AOKI, T. USUI, R. FROMKNECHT, K. SUZUKI, T. MORISHITA, S. TANAKA	949
Design and Performance of Ozone Generator for Preparation of Superconducting Oxide Thin Films S. ICHIMURA, S. HOSOKAWA, H. NONAKA, T. SHIMIZU, K. ARAI	953
Synthesis of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Thin Films by the Spray-ICP Technique M. SUZUKI, M. KAGAWA, Y. SYONO, T. HIRAI	957
Preparation of YBCO Superconducting Films by MOMBE K. ENDO, S. SAYA, S. MISAWA, S. YOSHIDA	961
Reproducible Preparation and Properties of Y-Ba-Cu-O Films by MOCVD S. MATSUNO, F. UCHIKAWA, S. UTSUNOMIYA, M. TANAKA	965
Preparation of Y-Ba-Cu-O Superconducting Films by MOCVD Using Ozone H. OHNISHI, H. HARIMA, Y. KUSAKABE, M. KOBAYASHI, K. TACHIBANA	969
Preparation of a-Axis and c-Axis Oriented Y-Ba-Cu-O Superconducting Oxide Films by CVD H. YAMANE, M. HASEI, T. HIRAI, K. WATANABE, N. KOBAYASHI, H. KUROSAWA, Y. MUTO	973
Properties of $\text{YBa}_2\text{Cu}_3\text{O}_y$ Films on BaSnO_3 Layers T. MATSUBARA, S. OHASHI, A. TAKENAKA, T. MORIMOTO	977
Excimer Laser-Induced Chemical Vapor Deposition of Metal Oxides Thin Film from β -Diketone Complexes T. USHIDA, K. HIGASHIYAMA, I. HIRABAYASHI	981
Characteristics of YBaCuO Films with Cu-rich Composition Grown by CVD K. HIGASHIYAMA, T. USHIDA, I. HIRABAYASHI	985
Formation of Y-Ba-Cu-O Ultrathin Films by In Situ Oxidation of Metallic Components R. KITA, T. HASE, M. SASAKI, T. MORISHITA, S. TANAKA	989
The Effect of Temperature and Oxygen Partial Pressure on Appearance of 124 Phase in MOCVD Film H. HAYASHI, K. SUGAWARA, Y. SHIOHARA	993
Growth and Characterization of a Semiconductor-Superconductor Heterostructure: the $\text{Hg}_{1-x}\text{Cd}_x\text{Te}/\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ System J.T. CHEUNG, I. GERGIS, P. KOBRIN, J. ARIAS, R.E. DEWAMES	997

Millimeter-Wave Properties of Epitaxial $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Films Grown by Several Methods P.H. KOBRIN, J.T. CHEUNG, W.W. HO, N. GLASS, J. LOPEZ, I.S. GERGIS, R.E. DEWAMES, W.F. HALL	1001
Epitaxial $\text{YBa}_2\text{Cu}_3\text{O}_x/\text{PrBa}_2\text{Cu}_3\text{O}_x/\text{YBa}_2\text{Cu}_3\text{O}_x$ Multilayer Structure by Coevaporation T. SATOH, T. YOSHITAKE, H. IGARASHI, H. HOSHINO	1005

6.2 BSCCO and Related Films

Growth of Metastable Phases and Superlattice Structures of Bi-Sr-Ca-Cu-O Compounds by an Atomic Layering MBE Technique D.G. SCHLOM, A.F. MARSHALL, J.S. HARRIS, JR., I. BOZOVIC, J.N. ECKSTEIN	1011
BSCCO Superconducting Films Grown by MOCVD K. ENDO, K. NAKATSUKA, S. MISAWA, S. YOSHIDA	1017
AS-Deposited Superconducting Bi-Sr-Ca-Cu-O Thin Films with Critical Temperature of 95K K. OHBAYASHI, M. ANMA, Y. TAKAI, H. HAYAKAWA	1021
Epitaxial Growth Study of $\text{Bi}_2(\text{Sr}, \text{Ca})_3\text{Cu}_2\text{O}_x$ Films on Cleaved MgO Substrates J. FUJITA, T. YOSHITAKE, T. SATOH, H. IGARASHI	1025
Formation of BiSrCaCuO Thin Films with (11n) Orientation on SrTiO_3 (110) Substrates by RF Magnetron Sputtering K. KURODA, K. KOJIMA, O. WADA, J. TANIMURA, M. TANIOKU, K. YOKOYAMA, K. HAMANAKA	1029
Preparation of Bi-Sr-Ca-Cu-O Thin Films by Facing Targets Sputtering Method M. IMAFUKU	1033
Bi-Sr-Ca-Cu-O Thin Films Grown by RF Magnetron Sputtering N. HAYASHI, S. OKUDA, S. TAKANO, D. MINAGUCHI, S. TERAJ, K. HASEGAWA	1037
Effect of High Gravitational Field on Superconducting Oxide Films M. OKANO, H. TANAKA, K. AGATSUMA, S. FUCHINO, K. KAJIMURA	1041
Preparations of Flat 80K-Phase Bi-Sr-Ca-Cu-O Superconducting Thin Films H. HIGASHI, S. KISHIDA, H. TOKUTAKA, K. NISHIMORI, N. ISHIHARA	1045
(100) Oriented BSCCO Thin Film by RF Magnetron Sputtering H. HATTORI, H. ITOZAKI, S. YAZU	1049
Superconducting Multi-layers of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y/\text{Bi}_2\text{Sr}_2\text{CuO}_x$ Grown by RF Magnetron Sputtering K. SETSUNE, T. MATSUSHIMA, Y. ICHIKAWA, H. ADACHI, K. WASA	1053
The Surface Characterizations of 80K-Phase Bi(Pb)-Sr-Ca-Cu-O Bulk Single Crystals and Thin Films H. FUJIMOTO, W. FUTO, H. HIGASHI, S. KISHIDA, H. TOKUTAKA, K. NISHIMORI, N. ISHIHARA, K. YAMANO, S. KOYAMA	1057

Time-Resolved Observation on Substrate Biasing Pulsed Laser Deposition H. IZUMI, K. OHATA, T. SAWADA, K. SUZUKI, T. MORISHITA, S. TANAKA ...	1061
Effect of Activated Oxygen on Crystalline Orientation in Bi-Sr-Ca-Cu-O Thin Films Y. ISHIZUKA, Y. TERASHIMA, T. MIURA	1065
Preparation of Bi-Sr-Ca-Cu-O Films by MBE Using an Oxygen Radical Beam Source H. FURUKAWA, S. TOKUNAGA, M. NAKAO	1069
Fabrication of Bi-Sr-Ca-Cu-O Thin Films with Layer-by-layer Deposition K. YOSHIKAWA, N. SASAKI	1073
Growth Characteristics of Bi-Sr-(Ca)-Cu-O Films Prepared by ECR Plasma Assisted Sequential Deposition M. KAMEI, I. YOSHIDA, K. SUZUKI, T. MORISHITA, S. TANAKA	1077
In Situ Growth of Sequentially Deposited Bi-Sr-Ca-Cu-O Thin Films by Molecular Beam Epitaxy Technique I. TSUKADA, Y. NAKAYAMA, H. WATANABE, I. TERASAKI, A. MAEDA, K. UCHINOKURA	1081
In Situ Growth of Bi-Sr-Ca-Cu-O Thin Films by Molecular Beam Epitaxy S. SAKAI, Y. KASAI, S. HOSOKAWA, S. ICHIMURA	1085
Study on Doping Properties of BSCCO/GaAs Films S. TOKUNAGA, H. KUWAHARA, H. FURUKAWA, M. NAKAO	1089
The Role of Grain-Boundaries in the Transport Properties of CVD-Grown Bi-Sr-Ca-Cu-O Films C. TANAKA, T. NAKAMURA, H. YAMAWAKI, T. KIMURA, O. UEDA, M. IHARA	1093
BSCCO/Sapphire Grown by Plasma-Enhanced Halide CVD H. NAKAO, T. KIMURA, H. YAMAWAKI, M. IHARA, M. OZEKI	1097
Preparation of BSCCO Thin Films by MOCVD Using Purified Source Materials S. HAYASHIDA, T. NAKAI, I. KOBAYASHI, Y. SUGIMORI, T. TSUYAMA, S. KOSHIBA	1101
Preparation of Bi-Sr-Ca-Cu-O Thin Films by Chemical Vapor Deposition S. AOKI, T. YAMAGUCHI, N. SADAKATA, O. KOHNO, A. SAJI, N. KURODA, H. YOSHIDA	1105
Preparation and Properties of Bi-Sr-Ca-Cu-O Thin Films by MOCVD J. ISHIAI, S. YAMADA, S. YOSHIKAWA, K. ENDO	1109
Bi-based Superconducting Films Synthesized by a Combination of Metalorganic Deposition (MOD) and a Diffusion Process S. YAEGASHI, M. GREEN, H. MURAKAMI, J. NISHINO, Y. SHIOHARA	1113
Preparation and Characterization of Ultrathin BSCCO Films by MOCVD T. SUGIMOTO, M. YOSHIDA, K. SUGAWARA, Y. SHIOHARA	1117

Improvement of Critical Current in BiSrCaCuO Micropatterns by Oxygen Plasma Treatment Y. NAGAI, K. TSURU	1121
--	------

6.3 Other Superconducting Films

New Superconducting Thin Films of Pb-Based System Grown by Sputtering H. ADACHI, S. ADACHI, Y. ICHIKAWA, K. SETSUNE, K. WASA	1127
Superconducting Superlattices of (La, Sr) ₂ CuO ₄ /Sm ₂ CuO ₄ Prepared by an Excimer Laser Deposition Technique H. TABATA, T. KAWAI, S. KAWAI	1131
Fabrication by Laser MBE and In Situ Characterization of Layered Cuprates H. KOINUMA, H. NAGATA, T. HASHIMOTO, T. TSUKAHARA, S. GONDA, M. YOSHIMOTO	1135

7 Application

7.1 Devices

Novel Applications of Tl-Ca-Ba-Cu-O Thin Films to Active and Passive High Frequency Devices J.S. MARTENS, D.S. GINLEY, T.E. ZIPPERIAN, V.M. HIETALA, C.P. TIGGES	1143
Surface Impedance Measurements of YBa ₂ Cu ₃ O _{7-x} Thin Films in Stripline Resonators D.E. OATES, A.C. ANDERSON	1149
Tl-Ca-Ba-Cu-O Thin Film Passive Microwave Devices M.S. SCHMIDT, R. FORSE, R.B. HAMMOND, M.M. EDDY, W.L. OLSON	1155
In Situ Fabrication of Reproducible Josephson Tunnel Junctions Employing Co-evaporated YBaCuO Films I. IGUCHI, Z. WEN, H. OHTAKE, M. NASU, K. NAKAMURA	1161
Electromagnetic Wave Detections by High-T _c Superconducting Active Antennas T. OHNUMA, T. KUROKO, H. TOMI, M. SHIMEGI, Y. TANAKA, K. YOSHIDA	1167
Microwave Response of a YBCO Microbridge with Fine Particles and Its Application to a Josephson Mixer T. HIRANO, Y. YOSHISATO, M. TAKAI, K. NIKI, S. YOSHIKAWA, S. NAKANO	1171
High Temperature Superconducting Microwave Components R.G. DOROTHY, D.W. FACE, W.L. HOLSTEIN, C. WILKER, Z-Y. SHEN, D.B. LAUBACHER	1175
Microstriplines of Bi-Sr-Ca-Cu-O and Their Microwave Properties A. TANAKA, J. CRAIN, N. KAMEHARA, K. NIWA	1179

Epitaxial Growth of YBCO/MgO/YBCO Structure S. TANAKA, H. NAKANISHI, T. MATSUURA, K. HIGAKI, H. ITOZAKI, S. YAZU	1183
Electrical Characteristics of a $\text{La}_{1.5}\text{Ba}_{1.5}\text{Cu}_3\text{O}_{7-y}$ Thin Film and Its Contact with an $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Superconductor S. SAITOH, T. FUKAZAWA, Y. TARUTANI, K. TAKAGI	1187
Preparation of Tunnel-Type Junctions Consisting of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ Single Crystals K. TAKAHASHI, K. SHIMAOKA, M. KAMINO, Y. YOSHISATO, S. NAKANO	1191
Formation of Tunnel Barriers with Surface Plasma Treatment T. MATSUI, M. MIYAZAKI, T. KUROSAKA, G. MATSUBARA, A. NAKAYAMA, K. MUKAE, Y. OKABE	1195
Preparation and Patterning of Bi-System 2-2-1-2 Phase by Ca Diffusion into 2-2-0-1 Single Crystals T. USUKI, I. YASUI, K. YAMANO, M. KAMINO, Y. YOSHISATO, S. NAKANO ...	1199
Characteristics of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x/\text{Bi}_2\text{Sr}_2\text{CuO}_y/\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_z$ Josephson Junctions K. MIZUNO, H. HIGASHINO, K. SETSUNE, K. WASA	1203
Proximity Effect in $\text{YBaCuO}/\text{Al}/\text{AlO}_x/\text{Pb}$ Planar Tunnel Junctions T. KUSUMORI, Z. WEN, H. OHTAKE, M. KAMIYA, I. IGUCHI	1207
Nonbolometric Optical Detection in High- T_c Superconducting Thin Films K. TANABE, Y. ENOMOTO, M. SUZUKI, S. KUBO, H. ASANO, T. IWATA, Y. TAJIMA, A. YAMAJI	1211
Photoresponse of Bi-Sr-Ca-Cu-O Thin Films S. OHYA, S. KARASAWA, N. HIDAKA, Y. KURIHARA, H.-U. HABERMEIER	1215
Optical Responses of Epitaxial $\text{ErBa}_2\text{Cu}_3\text{O}_y$ Superconducting Thin Films in Magnetic Field K. YOSHIARA, K. IMADA, F. UCHIKAWA, S. UTSUNOMIYA	1219
Superconductive Magnetoresistor Fabricated by Selective Growth of $\text{Y}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-x}$ Film Using Electrophoretic Deposition Technique H. SHINTAKU, H. NOJIMA, M. NAGATA, M. KOBAYASHI	1223
Current-Injection-Type Three-Terminal Devices Using High- T_c Superconductors H. HIGASHINO, K. MIZUNO, T. MATSUSHIMA, K. SETSUNE, K. WASA	1227
Superconducting Switching Device Using High- T_c Superconductor Thin Film H. SATOH, O. TSUKAMOTO	1231
Transport Properties of Quasi-Particle in Superconductors Using Monte-Carlo Simulation T. YAMAMOTO, H. SUZUKI, Y. YOSHISATO, S. NAKANO	1235
A Cryogenic Backward Diode H. TAMURA, A. YOSHIDA, S. HASUO	1239
Current Transport Characteristics of High- T_c Superconductor Under High Electric Field R. KAWASAKI, T. TSURUOKA, H. ABE	1243

A Study of Y211/123 Layered Films M. NEMOTO, H. MUKAIDA, M. NAKAO	1247
Chaotic Noise Phenomena in YBCO Thick Film Microbridges K.N.R. TAYLOR, G. ALVAREZ, A. BAILEY, G.J. RUSSELL	1251

7.2 Systems

Recent Progress in Superconducting Generator Program in Japan T. AGETA	1257
Current Status of Superconducting Maglev System J. FUJIE	1263
R&D on Superconducting Electromagnetic Propulsion Ship S. TAKEZAWA	1269
Design Study of 20MWh Solenoidal SMES for Integrated Demonstrative Test Model of Large-Scale SMES S. AKITA, Y. SANADA, T. SHINTOMI, T. TANAKA	1277
A Scheme for Development of Superconducting Magnetic Energy Storage System with Function of "Enthalpy Protection" Y. KOBAYASHI, M. JOUSHO, M. KUBO, K. ASANO, Y. ISHIGAKI	1281
Confirmation of SMES Effects for Power System Use H. FUJITA	1285
Economical and Technological Aspect of Small SMES (Superconducting Magnetic Energy Storage) M. MASUDA	1289
New Concept of a Superconducting Fault Current Limiter and Its Evaluation of Quenching Feature K. OKANIWA, T. HARA, T. YAMAMOTO, H. HOSHINO	1293
Study of Vertical Transportation System Using Superconducting Liner Motor H. NAGANO, M. KINUGASA, T. TOKIZAWA, K. HAYAKAWA, K. UESHIRO	1297
Comparison Y-, Bi-, and Tl-compound Bulk Lenses for Relativistic Electron Beams Y. ISHIBASHI, T. OSADA, H. MATSUZAWA, H. MARUMO, T. YOKOZAWA, Y. KOBAYASHI, M. KAWAMURA, M. OHISHI, N. MORIMOTO, T. NAGAKURA, A. TOHYAMA, T. AKITSU	1301
Observation of Supertron-Focused Electron Beams with a Streak Camera T. OSADA, Y. ISHIBASHI, H. MATSUZAWA, T. AKITSU	1305
Author Index	1309
Key Word Index	1315