

Phase Diagram Updates

This section is intended to provide the most current phase diagram data. Guidelines for the inclusion of new information in this section are (1) systems for which no phase diagrams are given in *Binary Alloy Phase Diagrams*, second edition; (2) complete diagrams that are substantially different from earlier versions published in *Binary Alloy Phase Diagrams*, second edition, the *Bulletin of Alloy Phase Diagrams*, or single-topic monographs; (3) partial diagrams that alter or clarify earlier versions in the above-mentioned publications; and (4) relevant new literature of interest.

Thermodynamic consistency of the new phase diagrams was checked based on phase rules, and the diagrams were modified if necessary. However, the diagrams and texts have not gone through the ordinary reviewing process, and the final evaluations may be carried out by relevant category editors of the Alloy Phase Diagram Program. For convenience, reaction tables and crystal structure data are added when new information is available.

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Al-Eu (Aluminum-Europium)

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The Al-Eu phase diagram (Fig. 1) modifies [Massalski2], which reproduced [Moffatt]. The liquidus in [Moffatt] was based entirely on assumed similarity to the Al-Yb phase diagram. It included two intermetallic phases, Al₄Eu and Al₂Eu.

[90Kon] determined the Al-rich corner (0 to 3.42 at.% Eu) of the Al-Eu phase diagram based on damping coefficient data measured at various temperatures. The L ↔ (Al) + Al₄Eu eutectic

point is 2.25 at.% Eu and 628 °C. The liquidus temperature at 3.42 at.% Eu is 754 °C. In addition to the two intermetallic phases in [Moffatt], [85Man] reported the existence of AlEu. Assuming similarity to the Al-Y system, AlEu is shown in Fig. 1 to form peritectically.

Crystal structure and lattice parameter data are summarized in Tables 1 and 2, respectively.

Table 1 Al-Eu Crystal Structure Data

Phase	Composition, at.% Eu	Pearson symbol	Space group	Strukturbericht designation	Prototype	Reference
(Al)	0	<i>cF4</i>	<i>Fm</i> $\bar{3}$ <i>m</i>	A1	Cu	[Massalski2]
Al ₄ Eu	20	<i>I4</i> 10	<i>I4/mmm</i>	D1 ₃	Al ₄ Ba	[64Kri]
Al ₂ Eu	33.3	<i>cF24</i>	<i>Fd</i> $\bar{3}$ <i>m</i>	C15	Cu ₂ Mg	[60Has]
AlEu	50	<i>oP18</i>	<i>Pnmm</i>	...	...	[85Man]
(Eu)	100	<i>cI2</i>	<i>Im</i> $\bar{3}$ <i>m</i>	A2	W	[Massalski2]

Table 2 Al-Eu Lattice Parameter Data

Phase	Composition, at.% Eu	Lattice parameters, nm			Reference
		<i>a</i>	<i>b</i>	<i>c</i>	
(Al)	0	0.40496	...	...	[Massalski2]
Al ₄ Eu	20	0.440	...	1.100	[64Kri]
Al ₂ Eu	33.3	0.4398	...	1.1170	[64Vuc]
AlEu	50	0.8125	...	...	[60Has]
AlEu	50	0.5806	0.9652	1.0088	[85Man]
(Eu)	100	0.45827	...	...	[Massalski2]