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Al-Pu (Aluminum-Plutonium)

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The Al-Pu phase diagram in [Massalski2] was redrawn from [1989Kas]. This diagram was similar to that shown in Fig. 1, but the (δPu) phase was shown to be stable down to at least 0 °C. However, [1991Adl] suggested that (δPu) decomposes into $AlPu_3$ and (αPu) by a eutectoid reaction at around 62 °C, based on thermodynamic modeling. [2007Tur] proposed the complete Al-Pu phase diagram, as shown in Fig. 1, by thermodynamic calculations. This phase diagram is in good agreement with [1991Adl]. Table 1 shows Al-Pu crystal structure data from [1989Kas] with modifications made to agree with Fig. 1.

References

1989Kas: M.E. Kassner and D.E. Peterson, The Al-Pu (Aluminum-Plutonium) System, *Bull. Alloy. Phase Diagrams*, 1989, **10**(4a), p 459-465

1991Adl: P.H. Adler, Thermodynamic Equilibrium in the Low-Solute Regions of Pu-Group IIIA Metal Binary Systems, *Metall. Trans. A*, 1991, **22**(10), p 2237-2246

2007Tur: P.E.A. Turchi, L. Kaufman, S. Zhou, and Z.K. Liu, Thermostatics and Kinetics of Transformations in Pu-based Alloys, *J. Alloys Compds.*, 2007, **444-445**, p 28-35

Table 1 Al-Pu crystal structure data

Phase	Composition, at.% Pu	Pearson symbol	Space group	Strukturbericht designation	Prototype
(Al)	0	*cF*4	$Fm\bar{3}m$	*A*1	Cu
Al_4Pu	20	*oI*20	*Imma*	$D1_b$	Al_4U
δAl_3Pu	25	*cP*4	$Pm\bar{3}m$	$L1_2$	$AuCu_3$
γAl_3Pu	25	*hP**	$P6_3/mmc$	...	...
βAl_3Pu	25	*hR**	$R\bar{3}m$	...	...
αAl_3Pu	25	*hR**	$R\bar{3}m$	...	...
Al_2Pu	33.3	*cF*24	$Fd\bar{3}m$	*C*15	Cu_2Mg
AlPu	50	*cI*58	...	...	...
$AlPu_3$	75	*tP*4	*P*4/*mmm*	...	Pb_3Sr
(εPu)	85.5-100	*cI*2	$Im\bar{3}m$	*A*2	W
(δ′Pu)	99.75-100	*tI*2	*I*4/*mmm*	*A*6	In
(δPu)	84.5-100	*cF*4	$Fm\bar{3}m$	*A*1	Cu
(γPu)	100	*oF*8	*Fddd*	...	γPu
(βPu)	100	*mC*34	*C*2/*m*	...	βPu
(αPu)	100	*mP*16	$P2_1/m$	...	αPu

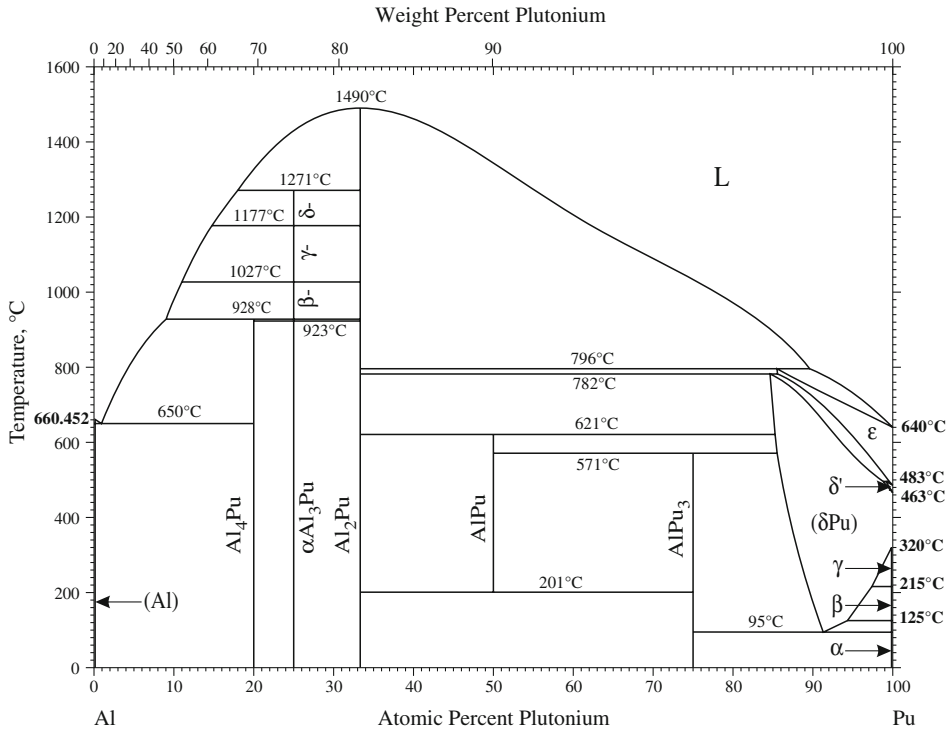

Fig. 1 Al-Pu phase diagram