

Am-O (Americium-Oxygen)

H. Okamoto

[1991Oka] introduced a partial Am-O phase diagram (60–67 at.% O) proposed by [1970Sar]. [2003Thi] revised this phase diagram, as reviewed by [2006Oka]. This phase diagram was superseded by the complete Am-O phase diagram (Fig. 1) reported by [2011Got]. Figure 2 shows the detail of Fig. 1 in the composition range between 58 and 68 at.% O.

Further corroboration may be needed with regard to the following features. The Am_2O_3 phase shown in [2003Thi] was dimorphic with the transition temperature at about 500°C. [2008Oto] proposed the existence of Am_7O_{12} and Am_9O_{16} , which do not fit in Fig. 1. The NaCl-type AmO phase reported earlier by [1967Aki] has not been confirmed since then. This phase may not exist in the stable state.

Table 1 Am-O crystal structure data

Phase	Composition, at.% O	Pearson symbol	Space group	Strukturbericht designation	Prototype
(γ Am)	0	<i>cI2</i>	<i>Im</i> $\bar{3}m$	A2	W
(β Am)	0	<i>cF4</i>	<i>Fm</i> $\bar{3}m$	A1	Cu
(α Am)	0	<i>hP4</i>	<i>P6</i> $\frac{3}{2}$ / <i>mmc</i>	A3'	α La
AmO (a)	50	<i>cF8</i>	<i>Fm</i> $\bar{3}m$	B1	NaCl
Am_2O_3	60	<i>hP5</i>	<i>P</i> $\bar{3}m1$	D5 ₂	La_2O_3
$\text{AmO}_{1.61}$	62
AmO_2	61–66.7	<i>cF12</i>	<i>Fm</i> $\bar{3}m$	C1	CaF_2

(a) Not shown in Fig. 1

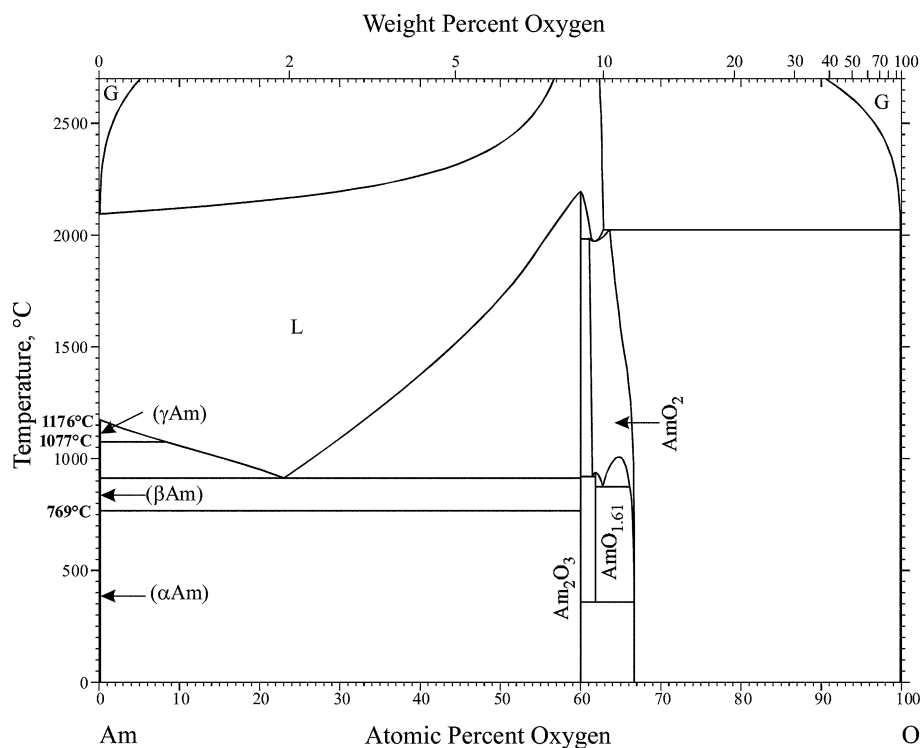


Fig. 1 Am-O phase diagram

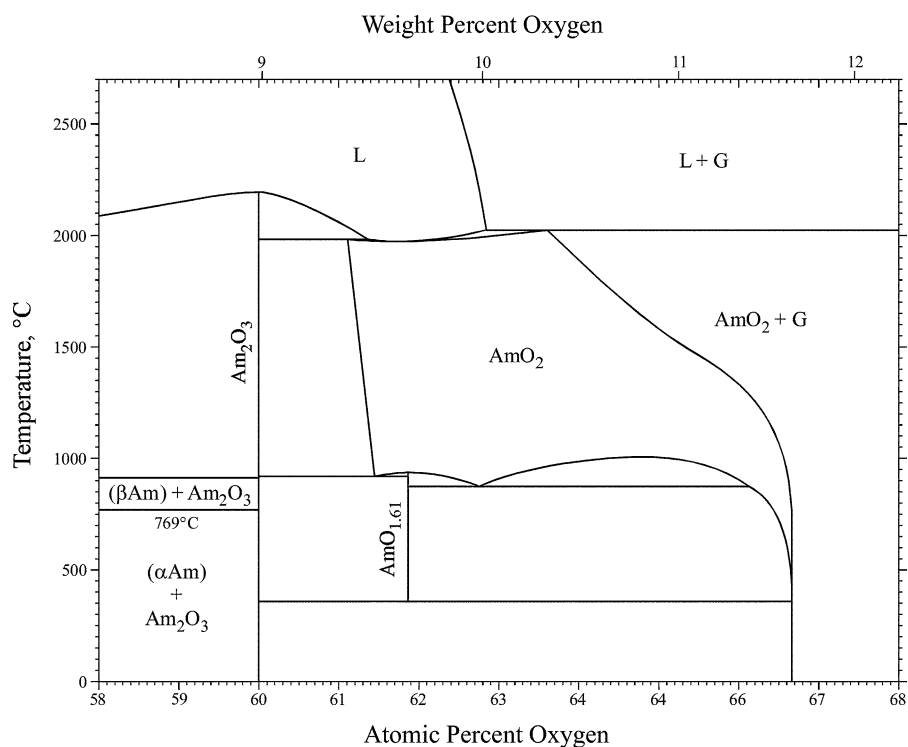


Fig. 2 Enlarged Am-O phase diagram (58 to 68 at.% O)

Table 1 shows Am-O crystal structure data.

References

- 1967Aki:** Y. Akimoto, A Note on AmN and AmO, *J. Inorg. Nucl. Chem.*, 1967, **29**, p 2650-2652
- 1970Sar:** C. Sari and E. Zamorani, An Investigation in the Americium Oxide System, *J. Nucl. Mater.*, 1970, **37**, p 324-330
- 1991Oka:** H. Okamoto, Am-O (Americium-Oxygen), *J. Phase Equilib.*, 1991, **12**(6), p 696-697
- 2003Thi:** C. Thiriet and R.J.M. Konings, Chemical Thermodynamic Representation of AmO_{2-x}, *J. Nucl. Mater.*, 2003, **320**, p 292-298
- 2006Oka:** H. Okamoto, Am-O (Americium-Oxygen), *J. Phase Equilib. Diffus.*, 2006, **27**(2), p 197
- 2008Oto:** H. Otobe, M. Akabori, and K. Minato, Oxygen Potential Measurement of Americium Oxide by Electromotive Force Method, *J. Am. Ceram. Soc.*, 2008, **91**, p 1981-1985
- 2011Got:** P. Gotcu-Freis, J.Y. Colle, C. Guéneau, N. Dupin, B. Sundman, and R.J.M. Konings, A Thermodynamic Study of the Pu-Am-O System, *J. Nucl. Mater.*, 2011, **414**, p 408-421