

Fe-Nd-S (Iron-Neodymium-Sulfur)

V. Raghavan

A brief review of this system by [88Rag] indicated the existence of the ternary compound FeNd_4S_7 . Recently, [91And] investigated the $\text{FeS-Nd}_2\text{S}_3$ pseudobinary section and did not detect the presence of any ternary compound.

Update

Using metallography, x-ray powder diffraction, and DTA measurements, [91And] determined a pseudobinary section

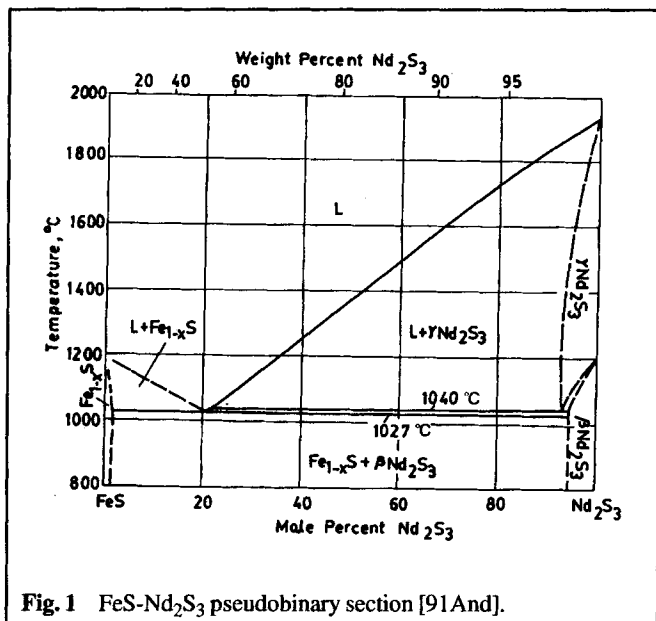


Fig. 1 FeS- Nd_2S_3 pseudobinary section [91And].

for this system along the $\text{FeS-Nd}_2\text{S}_3$ join. This section is redrawn in Fig. 1. The solidification is complete through a eutectic reaction at 21 mol% Nd_2S_3 and 1027 °C. The solubility of Nd_2S_3 in FeS at the eutectic temperature is 1.5 mol%. The solubility of FeS in Nd_2S_3 at 1220 °C is 6 mol% [91And]. The lattice parameter of Nd_2S_3 (Th_4P_3 -type cubic) decreases linearly from 0.8522 nm for pure $\gamma\text{Nd}_2\text{S}_3$ to 0.8515 nm for 6 mol% FeS dissolved in it [91And]. The melting point of Nd_2S_3 and its allotropic transformation temperatures found by [91And] are only in rough agreement with the data in [Massalski2].

The ternary compound FeNd_4S_7 , if present, should occur at 66.7 mol% Nd_2S_3 along this join. X-ray patterns obtained by [91And] at 66.7 mol% Nd_2S_3 did not indicate lines other than those of Nd_2S_3 and FeS . No heat effects corresponding to the formation of this compound were seen in the DTA results. Microstructures indicated the presence of only the eutectic mixture and either of the terminal phases.

Cited References

- 88Rag:** V. Raghavan, "The Fe-Nd-S System," *Phase Diagrams of Ternary Iron Alloys. Part 2*, Indian Institute of Metals, Calcutta, 195 (1988). (Review)
- 91And:** O. V. Andreev and V.M. Andreeva, "Phase Diagram of the FeS- Ln_2S_3 ($\text{Ln} = \text{Nd, Gd}$) Systems," *Izv. Akad. Nauk SSSR, Neorg. Mater.*, 27(11), 2261-2264 (1991) in Russian; TR: *Inorganic Mater.*, 27(11), 1927-1930 (1991). (Experimental; #)

Indicates presence of a phase diagram.