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High-temperature oxidation study of the Nb-18.7Si *in situ* composites doped with yttrium and scandium

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Abstract

In this paper the investigations results of the rare earths (particularly scandium and yttrium) effect on the structure and oxidation resistance of Nb-18.7Si *in situ* composites are presented. Features of the phase composition and microstructure of the eutectic Nb-Si alloys samples with different content of doping components were revealed by optical microscopy and electron probe microanalysis. It's found that the rare earths doping of the eutectic Nb-Si alloy leads to an increase of microstructure dispersity and stabilization of high-temperature silicide Nb_3Si in the hardening phase. Yttrium and scandium positive effect on the oxidation of composites, reducing the rate of the oxide film formation if doping elements concentration is 1-2 at.% and temperature is lower pesting point (815 ^oC). The results of research of the microstructure and composition of the oxide layer indicates the combination of surface and internal oxidations, as evidenced by the formation of internal oxidation zone, keeping the two-phase structure and the initial ratio of elements in composites.