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Comparison of two kinds of Si-B-Y co-deposition coatings on an Nb-Ti-Si based alloy by pack cementation method

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Abstract

Two kinds of Si-B-Y co-deposition coatings on an Nb-Ti-Si based alloy were prepared by pack cementation method and their microstructure and oxidation behavior were investigated. Results indicated that the coating prepared with higher B content in the pack was comprised of a porous NbB_2 outer layer, a $NbSi_2$ intermediate layer and a transitional layer, while the coating prepared with less B content in the pack consisted of a $NbSi_2$ outer layer with NbB_2 dispersed in its upper part and a transitional layer. The oxidation tests showed that both the coatings can provide a good protection at 850 °C within 100 h. However, the coating prepared with higher B was non-protective at 1250 °C, and the formed scale was brittle and can peel off easily. The coating prepared with less B content exhibited a good oxidation resistance at 1250 °C, which should be attributed to the compactness of the coating, a proper B content and the Y elements in the coating.

Keywords: Silicide coating; High-temperature alloys; Intermetallic; Oxidation; Pack cementation

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