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## Microstructure and high-temperature oxidation-resistant performance of four silicide coatings on Nb-Ti-Si based alloy prepared by pack cementation process

The microstructure and high-temperature oxidation-resistant performance of four silicide coatings prepared respectively at 1250°C for 8 h by pack siliconizing process, Si-Y co-deposition process and Si-Al-Y co-deposition process (with different Al contents in the packs) on an Nb-Si based alloy were revealed. The results showed that the purely siliconized coating was composed of a $(Ti,Nb)5Si_3$ ouer layer, a $(Nb,X)Si_2$ (X represents Ti, Cr and Hf elements) middle layer and a $(Ti,Nb)5Si_4$ inner layer. A thicker and more compact double-layer structure including a $(Nb,X)Si_2$ outer layer and a $(Ti,Nb)5Si_4$ inner layer was observed in the Si-Y co-deposition coating. In addition, a higher Y content (about 0.34 at. %) in the outer layer of the Si-Y co-deposition coating was obtained, while the Y content was only about 0.06 at. % in the purely siliconized coating. The Si-Al-Y co-deposition coating possessed a $(Nb,X)Si_2$ outer layer, a $(Ti,Nb)5Si_4$ middle layer and an Al, Cr-rich inner layer. A suitable addition of Al powders (5 wt. %) in the packs was beneficial to thicken the $(Nb,X)Si_2$ outer layer, while a sharp reduction in the coating thickness was found when excess Al powders (10 wt. %) was added in the packs. The thickness and microstructure of the scales formed on above four coatings upon oxidation at 1250°C for either 5 h or 100 h were comparatively investigated. The oxidation resistance of these silicide-type coatings was notably enhanced by the addition of Y and Al. The Si-Al-Y co-deposition coating prepared with 5 wt. % Al powders in the pack, possessed the best oxidation resistance due to its optimum dense and continuous scale and compact coating remained.

### Speaker Biography

Xiping Guo has completed his PhD in 1992 from Northwestern Polytechnical University, China. He is the professor of Northwestern Polytechnical University, China. His research interests are in the fields of ultrahigh temperature structural metallic materials, oxidation resistant coating technologies and directional solidification techniques. He has over 260 publications that have been cited over 1300 times, and his publication H-index is 20.

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