

MoSi₂/NbSi₂ composite coating on Nb-Si based alloy

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Abstract Nb-Si based alloys have been considered to be a promising substitute material for Ni based alloys owing to their attractive advantages such as relatively low density (~7 g/cm³), high melting point, good high temperature strength and acceptable fracture toughness. However, the poor oxidation resistance of Nb-Si based alloys limits their applications in oxidizing environment at high temperatures. MoSi₂ is an attractive coating material to protect Nb-Si based alloys due to the formation of continuous and dense glassy silica scale at high temperatures. Slurry sintering has always been considered to prepare MoSi₂ coating for its low cost, easy operation and suitable for workpieces with complex shapes. However, one problem is that the silicide coating prepared by slurry sintering method usually has a low density, which seriously affects the service life of the coating. This report will introduce the research results in the preparation technology of MoSi₂ coatings in recent years, especially the research progress in slurry sintering method. It is found that through interface and structure design, the densification of MoSi₂ coating can be achieved by slurry sintering. The MoSi₂/NbSi₂ composite coating also has a good interface bonding. The interface diffusion barrier, interface microstructure evolution, and densification mechanism of the MoSi₂/NbSi₂ composite coating by slurry sintering were revealed. The high-temperature oxidation resistance of MoSi₂/NbSi₂ composite coating were studied in detail. The research results will provide support for high-performance coating materials and technologies for high-temperature components in the aerospace field.

Keywords Nb-Si based alloy; MoSi₂; Slurry sintering; Composite coating; Oxidation resistance

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