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ADVANCED $\text{MoSi}_2/\text{NbSi}_2/\text{Nb}_5\text{Si}_3$ MULTILAYER COATING ON NIOBIUM ALLOY FOR THE
BIPROPELLANT ROCKET ENGINE**Abstract**

Dense and fine grained Mo coating was deposited on the Nb-based alloy by arc ion plating, and then the Mo coated Nb-based alloy specimens were silicidized to form $\text{MoSi}_2/\text{NbSi}_2/\text{Nb}_5\text{Si}_3$ multilayer coating by silicon pack cementation. The morphology, structure and components of as-deposited Mo coating and $\text{MoSi}_2/\text{NbSi}_2/\text{Nb}_5\text{Si}_3$ multilayer coating after silicon pack cementation were studied. For the $\text{MoSi}_2/\text{NbSi}_2/\text{Nb}_5\text{Si}_3$ multilayer coated Nb-based alloy specimens, the oxidation resistance in static at 1800 °C and thermal shock from room temperature to 1700 °C were tested. The results show that the oxidation resistance of life time for $\text{MoSi}_2/\text{NbSi}_2/\text{Nb}_5\text{Si}_3$ multilayer coated Nb-based specimens at 1800 °C reaches 30 hours and the times of the thermal shock is 1300 cycles at 1700 °C. Hot fire test showed that the engine operated 415s at 1450 °C, and 100s at 1610 °C, the coating is not broken.