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MOLDING OF LOW-COST COMPOSITE CERAMIC INSULATION MATERIALS AND ITS
APPLICATION IN THERMAL PROTECTION OF MISSILE OVER LARGE AREA**Abstract**

Under the harsh environment of long-endurance and high Mach, the temperature of missile exterior surface is too high to maintain the airframe aerodynamic shape and strength. Besides, the severe aerodynamic heating will be a threat to the normal working of the instrument in cabin. Therefore, thermal protection of projectile over large area is essential, and the research and development of high-temperature anti-insulation materials has become an urgent problem to the improvement of missile. In this paper, low-cost composite ceramic insulation materials were made by cheap high-silica fiber impregnated silica sol. The optimum parameters of fiber weave, composite numbers and heat treatment system were established through a large number of technological trials. The composite material had a good force thermal property. Its tensile strength was above 35MPa, and its bending strength was above 60MPa, so it could remain intact at 1000ablated 5min. Compared to silicon carbide and silicon nitride ceramic composite materials, its costs were lower and processing performance was better. In addition, it was high cost-effective and was suitable for application over large area. In order to solve the adhesion strength of the composite ceramic material and the elastomer, anti-insulation structure specimen coupled by silicon carbide screws and nuts was investigated, and its heat flow experiments was conducted. The experimental results showed that the surface of anti-insulation structure was intact, the structure was no damage, and the connection strength was reliable. The anti-insulation structure can satisfy the requirements of the thermal protection of projectile in large area, so it has a good application prospects.