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MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Advanced Materials and Structures for High Temperature Applications (4)

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THERMO-CHEMICAL ABLATION MECHANISM OF EPDM INTERNAL INSULATOR

**Abstract**

EPDM (Ethylene-Propylene-Diene) internal insulator is one kind of advanced heat-resistant materials. It is made of EPDM rubber, silica, aramid fiber and zinc borate. Under the action of high-temperature and oxidative propellant combustion products, the insulation material will take place complicated decomposition and carbonization reactions. Obviously, the characteristics of char layer of the insulator have strong effect on the linear ablation rate. The formation and the typical reactions of char layer of EPDM internal insulator were investigated by means of the pipe furnace, oxygen-acetylene flame stream, and motor test etc. The composition of the char layer was characterized by means of XPS, XRD and FTIR. The in-situ formed silicon carbide was detected in the char layer of EPDM insulator, which is in favor of decreasing the linear ablation rate. The formation and consumption reactions of SiC in the char layer of EPDM insulator were studied. The four-reaction ablation mechanism of the EPDM internal insulator was established.