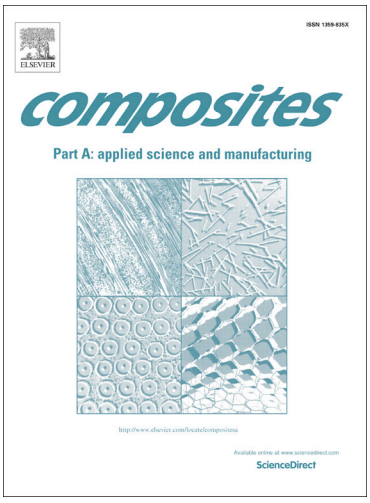

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PII: S1359-835X(18)30131-3
DOI: https://doi.org/10.1016/j.compositesa.2018.03.029
Reference: JCOMA 4986

To appear in: *Composites: Part A*

Received Date: 31 October 2017
Revised Date: 20 March 2018
Accepted Date: 21 March 2018

Please cite this article as: Li, J., Liu, K., Guo, M., Liu, Y., Wang, J., Lv, X., Ablation and erosion characteristics of EPDM composites under SRM operating conditions, *Composites: Part A* (2018), doi: https://doi.org/10.1016/j.compositesa.2018.03.029

Ablation and erosion characteristics of EPDM composites under SRM operating conditions

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Abstract

The ablation and erosion characteristics of ethylene propylene diene monomer (EPDM) composites under realistic solid rocket motor operating conditions were studied using an ablation motor and an overload simulation erosion motor. Silica fillers and aramid fibers have important effects on the ablation resistance of EPDM composites. The ablation resistance properties of non-silica and non-fiber formulations are obviously poor and worsen under erosion conditions with dense particle jets. From the analysis of the morphology and structure of the composite char layers, the combined use of silica and aramid fibers can make the char layer form a uniform network-like structure with a compact surface and a loose interior, improving both the heat-shielding and erosion-resistance performances of the char layer. By increasing the silica and aramid fiber contents, the erosion resistance performance of EPDM composite was improved under dense particle jet conditions.

Keywords: Polymer-matrix composites (PMCs); High-temperature properties; Porosity; Electron microscopy

1. Introduction

Ethylene propylene diene monomer (EPDM) composite is a type of carbonized ablation material produced by adding fillers to an EPDM rubber matrix, mixing it with other additives, and vulcanizing the mixed material. Its low density, high elongation, and good ablation

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