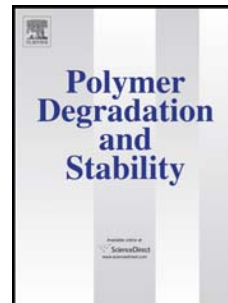


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EPDM based Heat Shielding Materials for Solid Rocket Motors: a comparative study of different fibrous reinforcements

Maurizio Natali, Marco Rallini, Debora Puglia, Josè Kenny, Luigi Torre*

University of Perugia, INSTM, Perugia Research Unit, 05100 Terni - Italy

**Corresponding author: torrel@unipg.it, +39 0744 492918*

Abstract

EPDM/aramid ablatives represent the state of the art heat shielding materials for Solid Rocket Motors. Due to their mechanical properties and excellent thermal stability, aramid fibers or pulp constitute the common reinforcement of EPDM based liners. New generation organic fibers were recently tested as a potential replacement of aramid. In this study, Kynol fiber, a phenolic based reinforcement with high mechanical and thermal properties, was evaluated on this class of ablatives: to date, there are no data available on the use of Kynol fibers in EPDM based ablatives. At the same time, silica fibers which are traditionally used on other classes of ablatives, were also tested: in fact, the use of this type of reinforcement is not well documented on EPDM ablatives. It was found that EPDM /Kynol composition produced the char with the smaller dimensional change and the higher adhesion on the virgin material. EPDM/aramid exhibited the higher insulation properties. At the studied fiber percentage, EPDM/silica showed the worst behavior than the other formulations. The obtained data improved the comprehension of the role of the different fibers on the ablation mechanism of this class of ablatives, thus enabling the possibility to exploit their intrinsic properties.

1. Introduction

Polymeric Ablative Materials (PAMs) are used to protect vehicles and probes during the hypersonic flight through a planetary atmosphere [1]; PAMs are also used to produce rocket combustion chambers

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