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Carbon foam based on epoxy/novolac precursor as porous micro-filler of epoxy composites

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Abstract:

The concept of application of crumbled carbon foam obtained from polymer precursor as a filler in polymer/carbon composite was described. The carbon foam used as powdered reinforcement of composites was prepared from epoxy resin cross-linked with phenol-formaldehyde resin (novolac) in a self-foaming process followed by carbonization at not very high temperature and ambient pressure. The structure of the carbon foam filler and resultant composites was studied by microscopic and spectroscopic methods. In the final composites, there were observed good quality dispersion of micronized grains of carbon foam, with the sizes that preserve their specific porous structure, in epoxy matrix and excellent adhesion at interfacial areas. The influence of the CF filler on the properties of resultant composites were investigated. Due to valuable properties of carbon foam, resultant composites occurred to have interesting characteristics: densities similar to those of pure polymer matrix, advantageous thermal and viscoelastic properties and enhanced tribological features.

Keywords: A. Polymer-matrix composites (PMCs), A. Particle-reinforcement, B. Wear mechanism, Carbon foam.

1. Introduction

One of the major objectives of material sciences is to provide composite materials with high mechanical strength and good thermal and electrical properties, while reducing weight and providing high resistance to external factors. A group of materials that can meet these requirements is polymer-carbon composites. These are heterogeneous materials composed of polymer matrix and different kinds of carbon fillers. Up

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