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Enhanced Permittivity in Flexible Carbon-Fiber and Acrylic-Polyurethane Composites

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Abstract: Acrylic-polyurethane (APu) as one of self-adhesive materials has been widely used in various coating industries, however it has seldom caused the researchers concern on its dielectric property. In this paper, acrylic polyurethane and carbon fibers (CFs) composites with good dispersibility have been successfully prepared. The dielectric properties and ac conductivity of the CFs/APu composites as a function of frequency and volume fraction of CFs were studied. High dielectric constant about 700 (10 kHz) was observed in APu-14.7 % CFs composites. The outstanding dielectric properties make CFs/APu composites as promising candidates for thin-film capacitors, electromagnetic shielding and attenuation coatings.

Keywords: Polymeric composites; Acrylic polyurethane; Carbon fiber; Dielectrics; Electrical properties.

1. Introduction

It is well known that the dielectric constants of traditional polymeric materials are relatively low (<10) in comparison with ceramic materials. However, flexible and high breakdown field strength still make it possible for applications in high charge-storage capacitors and electronics [1-3]. In order to

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