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Enhanced mechanical and dielectric properties of an epoxy resin modified with hydroxyl-terminated polybutadiene

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Abstract

Epoxy (EP) modified with nonpolar rubbers have the potential to achieve a concurrent improvement in mechanical and dielectric properties, when the EP-rubber interface is properly manipulated. Here we investigate rubber toughened EP based on a non-polar hydroxyl terminated polybutadiene (HTPB), and a coupling agent, dimer fatty acid diisocyanate (DDI), in which the rubber is covalently bonded to the epoxy. The mechanical and dielectric properties can be improved with the addition of HTPB and are maximized at 15 phr of elastomer inclusion. The enhanced mechanical toughness is attributed to the extensive shear yielding induced by a large amount of uniformly dispersed rubber particles; the same morphology can also combine the good insulating properties of HTPB and dielectrically favorable interfaces. These facts along with the reduced dielectric constant and loss for the modified EP suggest that the HTPB-DDI-EP can be used as a promising insulating packaging material for microelectronic applications.

Keywords:

A. Resins
B. Mechanical properties
B. Fracture toughness
B. Electric properties

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