

Copper-filled electrically conductive adhesives with enhanced shear strength

Abstract

In this study, the effects of diethyl carbitol (diluent) and tertiary amines on the electrical, mechanical, and rheological properties of the Cu-filled polyurethane-based electrically conductive adhesives (ECAs) were investigated. Significant difference could be observed in the electrical resistivity and shear strength of ECA prepared with different amount of diethyl carbitol. Reduced electrical resistivity was found in ECAs prepared with addition of tertiary amines, but no obvious change was observed in the shear strength of the ECA joint. Rheological property of the ECA paste was investigated in order to understand the correlation of the viscosity of ECA paste and electrical resistivity and shear strength of ECA joint. Results revealed that decrease in viscosity of the ECA paste reduced electrical resistivity and enhanced shear strength of ECA joint. A Cu-filled polyurethane-based ECA with considerably low electrical resistivity at the magnitude order range of $10^{-3} \Omega \text{ cm}$, and significantly high shear strength (above 17 MPa) could be achieved.

Keywords

Conductive adhesive; Copper; Electrical resistivity; Shear strength; Viscosity