Surfactant-free synthesis of copper particles for electrically conductive adhesive applications

Abstract

In this study, a simple one-step microwave-assisted method was developed to synthesize Cu and Cu-Ag particles for application in electrically conductive adhesive (ECA). The particle size of the obtained Cu particles was about 1 µm to 3 µm, whereas Cu-Ag particles were in the range of 0.1 µm to 1.0 µm. ECA samples were cured at 175°C for 1 h. Results revealed that the as-cured ECAs showed significant differences in electrical resistivity. The resistivity of Cu-filled ECA was on the order of 10^{-5} Ω cm, which was lower than the Cu-Ag-filled ECAs with resistivity on the order of 10^{-3} Ω cm. The thermal stability of the ECAs was studied under high-temperature exposure at 125°C for 1000 h. Results showed that Cu-filled ECA was thermally stable for 1000 h of aging, whereas Cu-Ag-filled ECAs were thermally stable for aging time above 100 h.