Synthesis of butyl acrylate/acrylic acid copolymer composite including aluminum nitride for the enhancement of thermal conductivity

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Development trends in electronic devices are miniaturization in sizes and minimization in power output. However, this development sometime causes increase of device junction temperature exponentially during operation. The high junction temperature is a critical disadvantage by reducing the life span and reliability of electronics. In order to solve this heat problem, thermal interface materials (TIMs) are introduced to disseminate the heat generated in device operations. Thermal conductivity of TIMs is higher than that of air between heat sink and printed circuit board. Generally, TIMs require enough adhesive strength and electrical insulation in order to prevent electrical shortage in the gap. Thus, filler-polymer composites are commonly used as a type of TIMs. In this study, copolymer adhesives are synthesized by butyl acrylate and acrylic acid in organic solvent of ethyl acetate anhydrous, and the AlN filler is added to 25 wt%. Thermal conductivity of adhesive materials are measured by a laser flash method, and the monomer conversion are measured as a function of reaction time by a FTIR-ATR technique. The effects of composition and adhesive layer thickness on the adhesive properties are investigated.