Fabrication of Silver Nanoparticles-coated Boron Nitride for High Thermal Conductivity as Electrical Insulator via Electroless Deposition

설미나, 선한나, 김준영, 박인경, 남재도†
성균관대학교
(jdnam@skku.edu†)

With a recent trend of miniaturization for high-performance electric devices, power modules in electric vehicles usually require thermal management of high heat dissipation. As the accumulated heat is a key factor in thermal fatigue, thermal management has received a great attention in long-term reliability issues. Hexagonal boron nitride (h-BN) is considered as a promising high thermally-conductive material (30W/mk) while maintaining electrical insulation property. It has been reported that the metal-coated BN particles may preserve the electrically insulating nature but it could provide thermally-conductive paths. In this study, we introduced silver nanoparticles on the surface of h-BN (h-BN/Ag) via a electroless plating using electrostatic interactions. Precise control of the incorporated silver nanoparticles on the BN surface could enhance thermal conductivity while maintaining electrically-insulating nature of BN. The size of Ag was controlled between 80 and 240 nm in the diameter by adjusting the plating times, and the formation and morphology of Ag were investigated by X-ray diffraction and scanning electron microscopy.