

Thermally Conductive and Electrically Insulating PLA-PDA-Ag Hybrid Composites with Core-shell Structure

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High density integration of electronic circuits with miniaturization of devices and the electrical resistance generate heat inside the devices, which may cause malfunction and decrease lifespan of the devices. To solve this problem, heat dissipation material is required. Thermally conductive polymer composites are attracting attention as effective heat dissipation materials due to their advantages in processing and cost. Among them, thermally conducting with electrical insulating polymer composites are a good candidate for heat dissipation material in LED and electronic industries because they block heat and prevent current leakage. However, for high thermal conductivity, a large amount of filler is required, which is difficult to process and increases probability of aggregation. Thus, in this study, we designed thermally conducting but electrical insulating polymer composites based on core-shell structure of PLA-PDA-Ag hybrid nanoparticles. In particular, thanks to 3D inter-connected structure of core-shell, we achieved high thermal conductivity with a small amount of Ag fillers.