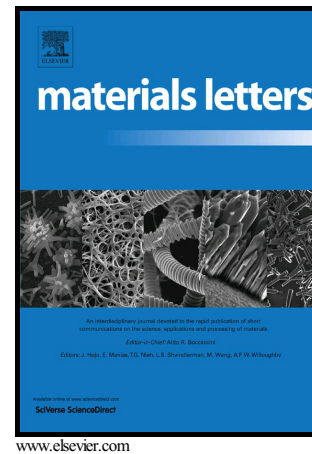


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Multilayer-structured high-performance nanocomposites based on a combination of silver nanoparticles and nanowires

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Abstract: We have successfully synthesized a multilayer-structured composite based on a combination of polydopamine (PDA)-coated silver nanoparticles (Ag@PDA) and silver nanowires (AgNWs@PDA) using a flexible and rapid method. We incorporated the structure into polyvinyl alcohol (PVA) polymer to enhance thermal conductivity and dielectric properties of nanocomposite films. Compared with Ag@PDA/PVA and AgNWs@PDA/PVA films, the use of multilayer-structure facilitated increased thermal conductivity and reduced permittivity of the nanocomposite film. The maximum thermal conductivity of composite with 10 wt % filler loading was increased to 3.63 W/mK, which is an enhancement by nearly 20 times compared with the use of neat PVA matrix. The relative permittivity and dielectric loss were about 6.65 and 0.024 at 1 MHz, respectively. We discussed the underlying mechanisms in an effort to optimize the structure for polymer matrix nanocomposites.

Keywords: nano-composites; electrical properties; thermal properties; coating

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