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High-resolution patterning of silver nanopaste containing volatile solvents achieved with gas-permeable mold

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Abstract:

Sub-400-nm high-resolution and -accuracy nanopatterning of silver nanopaste containing volatile solvents was demonstrated by thermal nanoimprint lithography using a porous, cyclodextrin-based, gas-permeable mold for the application of high-surface-area heat sinks. The silver nanoparticles have desirable heat-radiation characteristics. However, high-resolution and accurate nanopatterning of silver nanoparticles by thermal nanoimprint lithography is challenging because volatile dilution solvents, which are contained in nanoparticle pastes for high fluidity, can be trapped by gas-impermeable molds to cause pattern failures. The normalized heat-transfer amount of the 380-nm dense-line pattern of silver was calculated to be three times than that of the existing 10- μ m dense-line pattern.

Keywords:

silver nanopaste; volatile solvents; nanopatterning; nanoimprint lithography; gas-permeable mold

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