

The Fabrication of Graphene Nanomesh from Block Copolymer Self-assembly and Its Thermal and Thermoelectric Properties

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Graphene, a 2-dimensional carbon allotrope, has superior properties like high electrical and thermal conductivity, and higher transparency. These properties should be tuned to ambitious values for each application like thermoelectric application. By reducing the size of the graphene into nano-sized pattern, it is known that the thermal conductivity of the graphene is critically decreased due to edge-scattered phonon, but the electrical conductivity remains high. Also the thermopower expressed as Seebeck coefficient will be increased as of the quantum confinement effect and band gap opening. In this work, we fabricated the graphene nanomesh of 8 nm neck width via self-assembly of polystyrene-block-poly(vinyl-2-pyrrolidone). We showed the experimental data of the reduced thermal conductivity of ~ 78 W/mK and the increased thermopower of -520 mV/K as a function of neck width.