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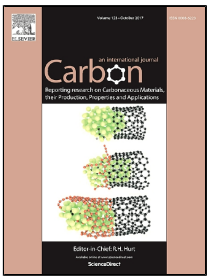

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Extenuated Interlayer Scattering in Double-Layered Graphene/Hexagonal Boron Nitride Heterostructure

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Abstract. Interlayer carrier scattering hampers electrical conduction in two-dimensional layered nanostructures. Extenuated carrier scattering is observed in a double-layered graphene system with hexagonal boron nitride (*h*-BN) as an interposer. Raman spectrum shows signature peaks with enhanced sharpness as compared with that of bilayer graphene. The density functional theory simulation shows degenerate energy bands in the *E-k* dispersion. The decoupling of the two graphene monolayers is further confirmed by electrical conduction measurements. Improved carrier mobility is observed in the graphene/*h*-BN/graphene heterostructure as compared with exfoliated or randomly-stacked graphene bilayer, indicating preserved Fermi velocity. The demonstrated behavior in graphene/*h*-BN/graphene heterostructure suggests a pathway to preserve the excellent carrier transport of pristine graphene monolayer in a multi-channel configuration, leading to implementation of highly conductive 2D heterostructure systems.

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