

Phonon coherence and phonon engineering in nanostructures and graphene isotope superlattices

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Isotopes have played an important role in semiconductors [1] and quantum information processing [2] and more recently in graphene [3]. In graphene, they have allowed the identification of new Raman processes [4], the analysis of hyperfine effects and spin coherence [5] and the full mapping of graphene growth [6]. Here we present recent results on using isotopes in graphene for phonon engineering and artificial superlattices down to a periodicity of 4nm. These superlattices lead to new coherent Raman processes and shine new light on our understanding of hot electron relaxation, thermal conductivity, phonon confinement and phonon coherence, which will be discussed.

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