Abstract Submitted
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Grain size dependent thermal conductivity of polycrystalline twisted bilayer graphene by Raman spectroscopy[1] TEJ B. LIMBU, Institute for Functional Nanomaterials, KONSTANZE R. HAHN, University of Cagliari, FRANK MENDOZA, Institute for Functional Nanomaterials, SATYAPRAKASH SAHOO, Institute of Physics, Bhubaneswar, JOSHUA J. RAZINK, Center for Advanced Materials Characterization at Oregon, RAM S. KATIYAR, BRAD R. WEINER, GERARDO MORELL, Institute for Functional Nanomaterials — We report here the results of an investigation on the grain size dependent room temperature thermal conductivity of a polycrystalline tBLG by employing a noncontact optical technique based on micro-Raman spectroscopy. Polycrystalline tBLG sheets of different grain sizes were synthesized on copper by hot filament chemical vapor deposition. The measured thermal conductivity values are 1305 ± 122,971 ± 73, and 657 ± 42 $Wm^{-1}K^{-1}$ for polycrystalline tBLG with grain sizes of 54, 21, and 8 nm, respectively. Based on these thermal conductivity values, we also estimated the grain boundary conductance, $(14.43 \pm 1.21) \times 10^{10}$ $Wm^{-2}K^{-1}$, and the thermal conductivity for single crystal tBLG, (1510 ± 103) $Wm^{-1}K^{-1}$. Our results show that the relative degradation of thermal conductivity due to grain boundaries is smaller in bilayer than in monolayer graphene. This result has been supported by molecular dynamics (MD) simulations. The quantitative study of the grain size dependent thermal conductivity of polycrystalline BLG is valuable in technological applications as well as for fundamental scientific understanding.

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