Interfacial Thermal Transport in Graphene Based Nanocomposites During First-Order Phase Transition

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Present study describes the molecular dynamics calculations of interfacial thermal transport during melting and solidification process of carbon based nanocomposites. Organic alkane n-eicosane is considered as the pristine phase change material. To enhance the thermal conductivity of organic alkane, highly conductive two-dimensional carbon nano inclusion (graphene nanoplatelets) structure is considered. Despite the high intrinsic thermal conductivity of graphene, it's utilization in thermal applications is very limited due to the high Kapitza resistance between the host matrix and its structure. In this talk, I demonstrate unusual changes in the interfacial thermal transport characteristics during the solid-liquid phase change. Strikingly, I show that during phase transition the interfacial thermal conductance increases 50 % in the solid state compared to the liquid state.

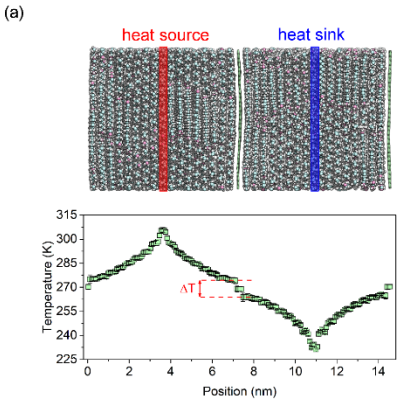

Figure 1: Simulation system of single layer-graphene.

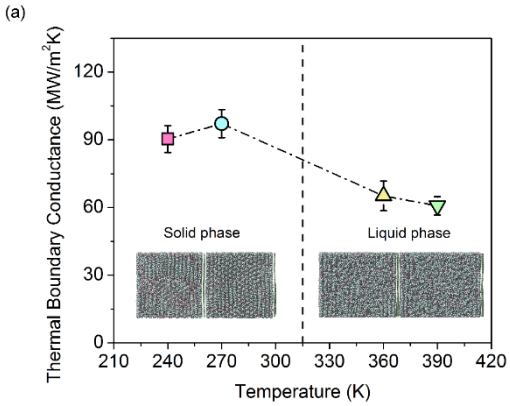

Figure 2: Thermal boundary conductance during phase transition.