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AC Impedance Study of the Structural Transformation of Graphite Suspensions[1] JIANJIAN WANG, GANG CHEN, Massachusetts Institute of Technology — Recently graphite suspensions have been demonstrated to possess very high thermal conductivity enhancements with high stability. However, the thermal conductivity is quite sensitive to the internal structures of the suspensions or the different states of the particulates in the liquids. At low graphite loadings, the graphite particulates can only form evenly distributed isolated clusters in the host material. As the graphite loading increases, the clusters will start merging together to form a 3D percolation network and the graphite suspension becomes gel-like. For the first time, we have observed a sharp kink behavior in the thermal conductivity of suspensions at the percolation threshold. Combined microstructural and AC impedance spectroscopy studies suggest that this kink arises from the change in the bonding strength between graphite flakes as the suspensions go through a transition from isolated clusters to percolated structures. Our studies shed light on the heat conduction mechanisms of nanofluids, suspensions and composites.

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Jianjian Wang
Massachusetts Institute of Technology

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