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Electro-Orientation of Boron-Nitride Nanotubes in Aqueous Solution SEMIH CETINDAG, Rutgers University, SANGIL KIM, Lawrence Livermore National Laboratory, BISHNU TIWARI, SHIVA BHANDARI, DONGYAN ZHANG, YOKE KHIN YAP, Michigan Technological University, JERRY SHAN, Rutgers University — Boron-nitride nanotubes (BNNTs), which have similar structure to carbon nanotubes but very different electronic properties, are of interest for a variety of applications, including hydrogen storage, water desalination, mechanical reinforcement and improving the thermal conductivity of composites. Many potential applications would benefit from alignment of BNNTs. We demonstrate, for the first time, the ability to align BNNTs, which are insulating at room temperature, with spatially uniform AC fields in aqueous solution. Electro-orientation rates are experimentally found to decline as the frequency of the AC field is increased. The behavior of the cross-over frequency with varying solution conductivity is suggestive of induced-charge-electro-osmotic (ICEO) alignment, despite the extremely low electrical conductivity of BNNTs. We further discuss electro-orientation with DNA-wrapped BNNTs and compare with pristine nanotubes.

Jerry Shan
Rutgers University

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