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DNA-wrapped Carbon nanotubes as a model rod-like colloid system

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Single-wall carbon nanotubes (SWCNTs) exhibit many fascinating physical behavior as the result of their quasi one-dimensional crystalline structures. SWCNTs can be dispersed into rod-like colloid particles by a few small molecules and polymers, among which the most effect one is single-stranded DNA (***Nature Materials*** 2, 338, 2003). The structure of a DNA-SWCNT hybrid is controlled by both the sequence of the wrapping DNA, and the atomic configuration, or chirality, of the SWCNT (***Science*** 302, 1545, 2003). This has been exploited by us to purify single-chirality SWCNTs from synthetic mixtures via liquid chromatography (***Nature*** 460, 250, 2009; ***JACS*** 133, 12998, 2011). DNA-SWCNTs have well-defined surface structures, tunable aspect-ratios, and ultra-small diameters. These attributes provide unique advantages to the DNA-SWCNT colloid system in probing inter-particle interactions in crowded and high salt environment (***ACS Nano*** 5, 8258, 2011). In this talk, I will present some recent observations we made on DNA-SWCNT clustering that shed new light on the Hofmeister effect.