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Self-assembly of anisotropic nanoparticles at oil/water interfaces JINBO HE, QINGLING ZHANG, SURESH GUPTA, TODD EMRICK, THOMAS RUSSELL, Department of Polymer Science & Engineering, University of Massachusetts, Amherst, MA 01003, USA, ZHONGWEI NIU, QIAN WANG, Department of Chemistry and Biochemistry and Nanocenter, University of South Carolina, Columbia, SC 29208, USA, THOMAS P. RUSSELL TEAM, TODD EMRICK COLLABORATION, QIAN WANG COLLABORATION — Self-assemblies of both bio- and synthetic nanorods with different aspect ratios have been studied at the oil/water interfaces. Tobacco mosaic virus (TMV) shows different geometries at the perfluorodecalin/water interface as the concentration changes in the bulk. With low concentration of TMV in the aqueous phase, TMV prefers lying randomly parallel to the interface to mediate as large interfacial tension per particle as possible. At high concentration, TMV prefers standing up at the interfaces, not only mediating the interfacial tension but also neutralizing the strong electrostatic interaction between each other. The similar phenomenon has also been observed with alkyl-chain-covered Cadmium Selenide nanorods at the toluene/water interface during solvent evaporation. These assemblies can be manipulated by controlling the interfacial tensions between different liquids; the surface properties, the aspect ratio and concentration of nanoparticles; and the ionic strength in solution.

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