Self-Assembly of Inorganic Nanorods Mimicking Organic Surfactants : Anisotropic Polymer Tethering on Heterostructure Nanorods

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Self assembly of nanorods is a result of interplay between their directionality and external forces. For example, the combination of nanorod and flexible polymer ligand enables the diverse ordered micellar structures by controlling the ratio and polarity of solvent. Granted, theoretical calculation has been used to unveil the assembly model. However, experimental investigation remains relatively unexplored, as the anisotropic functionalization on each nanorod is challenging.
Herein, we designed the micellar self-assembly of one-sided polymer-tethered nanorods. Firstly, we made nanorods with metal tip on one side via ostwald ripening, on which polymer was selectively tethered on the metal tip. By maximizing the gap of polarity between nanorod and polymer, we increased the effect of phase separation. The assembly was changed by not only solvent but also the aspect ratio of nanorod and the molecular weight of polymer. We will discuss the result in the context of similarity to the micellar structure of organic surfactant molecules.