Abstract Submitted
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Ligand-Driven Phase Separation in Binary Particle Brush Materials[1] MICHAEL BOCKSTALLER, MICHAEL SCHMITT, JIANAN ZHANG, JIAJUN YAN, KRZYSZTOF MATYJASZEWSKI, Carnegie Mellon University — The tethering of polymer chains to the surface of nanoparticles (to form so-called 'particle brush materials') has emerged as an effective means to enable the bottom-up assembly of one-component hybrid materials with controlled microstructure and improved mechanical stability as well as novel optical or acoustic properties. The polymer-like interactions and response of these particle-brush materials suggest intriguing new opportunities to control structure formation in multicomponent particle mixtures. This contribution will demonstrate that polymer-ligand interactions can drive phase separation processes in mixed particle systems that share analogies to those of regular binary polymer blends. The role of particle size, density and degree of polymerization of tethered chains as well as the interaction parameter between the distinct tethered chains on the mechanism and kinetics of phase separation processes in mixed particle brush systems will be discussed. Ligand-driven phase separation will be shown to enable the efficient fabrication of monochromatic domain structured in mixed quantum dot systems that might find application in next generation quantum dot-enabled LEDs.

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