

Polystyrene@TiO₂ Core-Shell Microsphere Colloidal Crystals and Nonspherical Macro-Porous Materials

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High-quality and stable PS@TiO₂ core-shell microsphere colloidal crystals were prepared by electrostatic colloid stabilization combined with two-substrate vertical deposition method. The polyelectrolyte stabilized colloids self-assembled into face-centered cubic arrays with the (111) face perpendicular to the substrate. These colloidal crystals are gifted with high mechanical stability toward the flow of solution. Structure-property correlations were made using scanning electron microscopy and UV-vis-NIR spectroscopy. Optical spectra showed the presence of an L-stopband peak in the photonic band structure. Besides, these PS@TiO₂ colloidal crystals can be used as templates to fabricate the nonspherical macro-porous materials, and from such structure can be more easily obtained complete band gaps than from their spherical counterparts due to their lower symmetries. This work will hold the promise of enhanced photonic band gap materials.

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