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Fabrication of Monolayer of Polymer/Colloids Hybrid at a Water-Air Interface CHI-CHIH HO, TING-HUI CHEN, PO-YUAN CHEN, KENG-HUI LIN, WEN-TAU JUAN, WEI-LI LEE, Institute of Physics, Academia Sinica, INSTITUTE OF PHYSICS, ACADEMIA SINICA TEAM — Polymer-assisted assembly of polystyrene (PS) colloids with diameter ranging from 100 nm to 1 μm at water-air interface is demonstrated. Initially, PS colloids were slowly spread onto water surface and crystallized into triangular lattice with finite separation between colloids due to the coulomb repulsive force. By adding merely 1-3 ppm water-soluble polyethylene oxide (PEO) in water, the colloids gradually moved closer. Eventually, the separation between colloids was equal to or less than 60 nm determined from its diffraction pattern by a laser beam. In addition, the Brownian motion of colloids was suppressed by the PEO adsorption effect which was demonstrated from the analysis of colloids trajectory recorded by ultra high speed camera. We showed that the resulting monolayer of colloids /PEO hybrid can be deposited on various substrates, including a plastics sheet, curved surface and even across 10 μm -diameter hole. Our method may further extend the scope of nanosphere lithography technique for large area nanostructure fabrication.

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