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Directed Nanoparticle Assembly onto Random Copolymer Templates: Kinetics and Surface Considerations MARLA MCCONNELL, SHU YANG, RUSSELL COMPOSTO, University of Pennsylvania — Recent efforts have focused on the development of nanoparticle arrays with controlled spacing. In this study, poly(styrene-ran-acrylic acid) films were prepared by spin-casting poly(styrene-ran-t-butyl acrylate), followed by thermal deprotection. Silica nanoparticles (10-15 nm in diameter) coated with self-assembled monolayers (SAMs) of (3-aminopropyl)triethoxysilane were covalently attached to the PS-ran-PAA films with an EDC/NHS coupling reaction. To measure the kinetics of nanoparticle attachment, films of either 25 or 50 weight percent acrylic acid were reacted with nanoparticle suspensions from 0.005 to 0.1 weight percent for varying lengths of time. SEM imaging of the nanoparticle surfaces showed that the particles were well dispersed, and that particle coverage increased with increasing AA and nanoparticle concentration, and time. SAMs containing an acrylic acid moiety were used as a non-swelling control surface, and particle attachment to these surfaces follow different kinetics than those observed for the polymeric substrates. The swelling of the polymeric substrates under the reaction conditions was found to influence the observed coverage kinetics, so film swelling was monitored with environmental AFM.

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