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Using Amphiphilic Copolymers and Nanoparticles to Organize Charged Biopolymers[1] JUNG HYUN PARK, MARLA MCCONNELL, YUJIE SUN, YALE GOLDMAN, RUSSELL COMPOSTO, University of Pennsylvania — Nanoparticles (NPs) on amphiphilic random copolymers control filamentous actin (F-actin) attachment. 3-aminopropyltriethoxysilane (APTES) coated silica NPs are selectively bonded to acrylic acid groups on the surface of a poly(styrene-r-acrylic acid) (PS-r-PAA) film. By changing the concentration of NPs in the medium, the surface density of positively charged anchors is tuned. Using total internal reflection fluorescence (TIRF) microscopy, immobilization of F-actin is observed via electrostatic interaction with NPs at high NP coverages. Below a critical coverage, F-actin is weakly attached and undergoes thermal fluctuations near the surface. Another method to tune F-actin attachment is to use APTES to cross-link and create positive charge in PAA films. Here, the surface coverage of F-actin decreases as APTES concentration increases. This observation is attributed to an increase in surface roughness and hydrophobicity that reduces the effective surface sites that attract F-actin. In addition, in-situ G-actin polymerization to F-actin is observed on both the NP and cross-linked PAA templates.

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