Abstract Submitted
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Polymer Nanocomposites as a Facile Method for Engineering Acto-Myosin Networks at the Interface MATTHEW CAPORIZZO, University of Pennsylvania Department of Materials Science and Engineering, YUJIE SUN, YALE GOLDMAN, University of Pennsylvania Department of Physiology, RUSSELL COMPOSTO, University of Pennsylvania Department of Materials Science and Engineering, NANO-BIO INTERFACE CENTER COLLABORATION — Filamentous actin acts as the rails for the molecular motor myosin in muscle contraction and intercellular mass transport. Consequently, understanding the process by which actin organizes, polymerizes, and binds is fundamental for the design of myosin based actuators capable of responding to external stimuli. Starting with atomically smooth, freshly cleaved mica optically coupled to glass slides, a random copolymer nanoparticle composite is engineered for *in situ* single molecule TIRF/AFM studies with controlled roughness, electrostatic binding strength, and binding site density. Four distinct regimes of actin binding are observed; no attachment, end-on attachment, weak side-on attachment, and side-on immobilization. Transitions between regimes are likely to mark competition between the affinity to charged nanoparticles and the inherent resistance of the semi-rigid filaments to bending. Surface conditions optimal for actin immobilization are identified, and Myosin V stepping kinetics are studied on the artificially immobilized filaments, confirming filament support of motility. Supported by NSF grant DMR-0425780.

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