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Transport along freely suspended actin cortex models in a controlled microfluidic environment SIMON SCHULZ, TAMAS HARASZTI, WOUTER ROOS, CHRISTIAN SCHMITZ, JENS ULMER, STEFAN GRAETER, JOACHIM P. SPATZ, Max-Planck-Institute for Metals Research, New Materials and Biosystems; University of Heidelberg, Biophysical Chemistry, 70569 Stuttgart, Germany — Arrays of microfabricated pillars are constructed to serve as a template for mimicking the actin cortex of cells. The three-dimensional template surface prevents interaction of the actin filaments hanging between pillars. A special flow-cell design enables applying flow around a network of actin freely suspended between polydimethylsiloxane pillars. This opens new possibilities to study the mechanics of two-dimensional actin networks as a function of actin-crosslinkers, to observe the active diffusion of molecular motors operating on pending networks and to investigate the alternations in the transport of microscopic particles, coated by different proteins and molecular motors, along these actin cortex models under the drag of flow. The stiffness of the F-actin can be tuned by bundling through various cross-linkers. Additionally, actin filaments act as tracks for guiding passive and active transport of cargo such as organelles or microspheres by molecular motors like myosin-V. These transport problems are biomimetic studies of tracks and external driving force on a statistical process of two-dimensional networks isolated from the complicated and undetermined cellular environment.

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