Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Mechanically tunable actin networks using programmable DNA based cross-linkers JOERG SCHNAUSS, University of Leipzig Fraunhofer Institute for Cell Therapy and Immunology IZI, JESSICA LORENZ, Fraunhofer Institute for Cell Therapy and Immunology IZI, CARSTEN SCHULDT, University of Leipzig Fraunhofer Institute for Cell Therapy and Immunology IZI, JOSEF KAES, University of Leipzig, DAVID SMITH, Fraunhofer Institute for Cell Therapy and Immunology IZI — Cells employ multiple cross-linkers with very different properties. Studies of the entire phase space, however, were infeasible since they were restricted to naturally occurring cross-linkers. These components cannot be controllably varied and differ in many parameters. We resolve this limitation by forming artificial actin cross-linkers, which can be controllably varied. The basic building block is DNA enabling a well-defined length variation. DNA can be attached to actin binding peptides with known binding affinities. We used bulk rheology to investigate mechanical properties of these networks. We were able to reproduce mechanical features of actin networks cross-linked by fascin by using a short version of our artificial complex with a high binding affinity. Additionally, we were able to resemble findings for the cross-linker alpha-actinin by employing a long cross-linker with a low binding affinity. Between these natural limits we investigated three different cross-linker lengths each with two different binding affinities. With these controlled variations we are able to precisely screen the phase space of cross-linked actin networks by changing only one specific parameter and not the entire set of properties as in the case of naturally occurring cross-linking complexes.

Joerg Schnauss
University of Leipzig
Fraunhofer Institute for Cell Therapy and Immunology IZI

Date submitted: 06 Nov 2015 Electronic form version 1.4