



# International Symposium on Polyelectrolytes

From Basic Science to Biological Applications

Research Workshop of the Israel Science Foundation

Ein Gedi, Israel, January 20-23, 2014

## SELF-ASSEMBLY OF INTERMEDIATE FILAMENTS IN THE PRESENCE OF COUNTER-IONS

Sarah Köster<sup>1</sup>, Martha Brennich<sup>1</sup>, Christian Dammann<sup>1</sup>, Harald Herrmann<sup>2</sup>

<sup>1</sup> Institute for X-Ray Physics, Georg-August-University Göttingen, Göttingen, Germany

<sup>2</sup> Functional Cell Architecture, DKFZ, Heidelberg, Germany

Intermediate filaments (IF) represent one of the three filament-systems of the cytoskeleton, besides actin filaments and microtubules. IFs are negatively charged and it has been shown that multivalent counterions cross-link networks of IFs.[1,2,3] Interestingly, upon truncation of the last 11 amino acids, the cross-linking effect vanishes, indicating that the interactions are mediated primarily by these final amino acids.[4] To elucidate the mechanisms behind IF-ion interactions we combine two complementary techniques, visible light fluorescence microscopy and small angle x-ray scattering (SAXS). Hence, we cover the length scales from micro- down to nanometers. Fluorescence microscopy is performed on 3D-confined networks in microfluidic drops to avoid any perturbing influences of surfaces. We are able to characterize network formation in dependence of the ion concentration, which can be tuned very precisely, as well as a function of time.[3] SAXS is a well suited method to study biomatter in solution at the nanometer scale. Static experiments in capillaries show the end-state of the assembly of IF solutions in the presence of different ions (monovalent, divalent). In contrast, experiments performed in continuous flow microfluidic mixers provide access to the dynamics of the self-assembly. Taken together, our results shed light on the interactions between IFs and counter-ions leading to self-assembly into (functional) units.

[1] Y.-C. Lin, N. Y. Yao, C. P. Broedersz, H. Herrmann, F. C. MacKintosh, and D. A. Weitz, Phys. Rev. Lett. 104, 058101 (2010).

[2] S. Köster, Y.-C. Lin, H. Herrmann, and D. A. Weitz, Soft Matter 6, 1910 (2010).

[3] Christian Dammann, Bernd Nöding and Sarah Köster, Biomicrofluidics 6, 022009 (2012).

[4] Y.-C. Lin, C. P. Broedersz, A. C. Rowat, T. Wedig, H. Herrmann, F. C. MacKintosh, and D. A. Weitz, J. Mol. Biol. 399(4), 637–644 (2010).



Ortra  
Meeting Point

Organized by:

Ortra Ltd. | Tel. +972-3-6384444 | E-mail: isp@ortra.com

Copyrights of pictures from Israel: Israel Ministry of Tourism [www.goisrael.com](http://www.goisrael.com)