



Polymer- & Soft-Matter-Seminar

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**Tuesday,
28th January
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at: 5.15 pm

VSP1 1.26,
Von-
Seckendorff-
Platz 1,
06120 Halle

“Tuning Interactions in Protein Solutions towards Controlled Protein Crystallization”

Non-specific protein-protein interactions in aqueous solution play a crucial role on protein crystallization and protein-aggregation related diseases, such as cataracts, and sickle cell anemia [1]. A comprehensive understanding of interactions in protein solutions is still a challenge. In this talk, I will first show an efficient way to tune interactions and phase behavior in protein solutions using salts, in particular with trivalent salts. For example, negatively charged globular proteins at neutral pH in the presence of multivalent metal ions undergo a “reentrant condensation (RC)” phase behavior [2-4]. SAXS has been used to characterize the effective interactions under various conditions. In the second part, I will discuss the non-classical pathway of protein crystallization based on our recent work. We show that crystallization near phase boundaries follows different mechanisms [5-7]. Real time SAXS measurements demonstrate that protein clusters formed via cation bridging act as precursors of nucleation with a reduced energy barrier [7]. Crystallographic analyses provide direct evidence of the crystal structure and cation binding sites [5].

[1] Gunton, J. D.; Shirayev, A.; Pagan, D. L. Protein Condensation-kinetic pathways to crystallization and disease; Cambridge University Press: New York, 2007.

[1] Gunton, J. D.; Shirayev, A.; Pagan, D. L. Protein Condensation-kinetic pathways to crystallization and disease; Cambridge University Press: New York, 2007.

[2] Zhang, F.; Skoda, M. W. A.; Jacobs, R. M. J.; et al. Phys. Rev. Lett. 2008, 101, 148101.

[3] Zhang, F.; Weggler, S.; Ziller, M.; et al. Proteins 2010, 78, 3450-3457.

[4] Roosen-Runge, F.; Heck, B.S.; Zhang, F.; Kohlbacher, O.; Schreiber, F. J. Phys. Chem. B 2013, 117, 5777.

[5] Zhang, F.; Zocher, G.; Sauter, A.; Stehle, T.; Schreiber, F. J. Appl. Cryst. 2011, 44, 755.

[6] Zhang, F.; Roth, R.; Wolf, M.; Roosen-Runge, F.; et al. Soft Matter 2012, 8, 1313.

[7] Zhang, F.; Roosen-Runge, F.; Sauter, A.; et al. Faraday Discuss. 2012, 159, 313.

