Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Arrest scenarios in concentrated protein solutions - from hard sphere glasses to arrested spinodal decomposition ANNA STRADNER, SASKIA BUCCIARELLI, LUCIA CASAL, Lund University, GIUSEPPE FOFFI, Université Paris-Sud 11, GEORGE THURSTON, Rochester Institute of Technology, BELA FARAGO, Institut Laue Langevin, PETER SCHURTENBERGER, Lund University — The occurrence of an arrest transition in concentrated colloid suspensions and its dependence on the interaction potential is a hot topic in soft matter. Such arrest transitions can also occur in concentrated protein solutions, as they exist e.g. in biological cells or are increasingly used in pharmaceutical formulations. Here we demonstrate the applicability of concepts from colloid science to understand the dynamics of concentrated protein solutions. In this presentation we report a combination of 3D light scattering, small-angle X-ray scattering and neutron spin echo measurements to study the structural properties as well as the collective and self diffusion of proteins in highly concentrated solutions on the relevant length and time scales. We demonstrate that various arrest scenarios indeed exist for different globular proteins. The proteins chosen are different bovine lens crystallins. We report examples of hard and attractive glass transitions and arrested spinodal decomposition directly linked to the effective pair potentials determined in static scattering experiments for the different proteins. We discuss these different arrest scenarios in view of possible applications of dense protein solutions as well as in view of their possible relevance for living systems.

Peter Schurtenberger
Lund University

Date submitted: 15 Nov 2013 Electronic form version 1.4