

***Alpha Crystallin Diffusion in Concentrated Suspensions***

***Laurence Lurio, Nuwan Karunaratne, Janae Debartolo, Justin Berry***

***Department of Physics, Northern Illinois University***

***George Thurston***

***Department of Physics, Rochester Institute of Technology***

***Suresh Narayanan and Alec Sandy***

***Advanced Photon Source, Argonne National Laboratory***

Alpha crystallin is one of the three crystallin proteins that comprise the optical media of the mammalian eye-lens. An improved understanding of the interactions between crystallin proteins in solution can provide insight into the mechanisms that lead to diseases of the eye such as presbyopia and cataract formation. Small-angle x-ray scattering has proven to be an important probe of protein interactions but such measurements provide information only on the average distances between particles and not on their dynamics. We have employed X-ray Photon Correlation Spectroscopy (XPCS) to measure the dynamics of concentrated alpha-crystallin suspensions. These measurements show that the alpha-crystallin is in a glassy phase at nominal volume fractions where non-interacting (hard-sphere like) proteins would be well within the fluid phase. We interpret this glassy behavior in terms of attractive interactions between the crystallins.