Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Nuclear magnetic resonance studies of bovine γB-crystallin[1]
GEORGE THURSTON, JEFFREY MILLS, LEA MICHEL, KAYLEE MATHEWS, JOHN ZANET, ANGEL PAYAN, KEITH VAN NOSTRAND, MICHAEL KOTLARCHYK, DAVID ROSS, Rochester Institute of Technology, CHRISTOPHER WAHLE, University of Findlay, JOHN HAMILTON, Rochester Institute of Technology — Anisotropy of shape and/or interactions play an important role in determining the properties of concentrated solutions of the eye lens protein, γB-crystallin, including its liquid-liquid phase transition. We are studying γB anisotropic interactions with use of nuclear magnetic resonance (NMR) concentration- and temperature-dependent chemical shift perturbations (CSPs). We analyze two-dimensional heteronuclear spin quantum coherence (HSQC) spectra on backbone nitrogen and attached hydrogen nuclei for CSPs, up to 3 percent volume fraction. Cumulative distribution functions of the CSPs show a concentration and temperature-dependent spread. Many peaks that are highly shifted with either concentration or temperature are close (i) crystal intermolecular contacts (ii) locations of cataractogenic point mutations of a homologous human protein, human γD-crystallin, and (iii) charged amino-acid residues. We also discuss the concentration- and temperature-dependence of NMR and quasielastic light scattering measurements of rotational and translational diffusion of γB crystallin in solution, affected by interprotein attractions.

[1]Supported by NIH EY018249

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Date submitted: 06 Nov 2015 Electronic form version 1.4