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Decoupling of Protein Dynamics from the Solvent Viscosity

SHEILA KHODADADI, Department of Polymer Science, The University of Akron, ARMISTEAD KATHLEEN, University of Kansas, ALEXEI SOKOLOV, Department of Polymer Science, The University of Akron — Studies show that solvent viscosity has a strong influence on protein dynamics and activity, but the detailed mechanism of the solvent-protein interactions is not fully understood. Using dielectric spectroscopy we were able to identify a protein related relaxation process of myoglobin in water-glycerol and water-sucrose solutions. We demonstrate that the rate of biochemical reaction (taken from literature¹) follows the protein related relaxation observed in dielectric spectra. Also our results reveal decoupling of protein dynamics from solvent viscosity. This finding explains the known in literature decoupling of protein activity from solvent viscosity and demonstrates direct connection between protein dynamics and its functionality. Possible microscopic mechanisms of this decoupling are discussed at the end. 1. Kleinert, T.; *et al. Biochemistry* **1998**, *37*, 717.

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