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Biomolecular solvation study of proteins in liquid water by a wide range gigahertz-to-terahertz spectroscopy ALI CHARKHESHT, DEEPU GEORGE, VINH NGUYEN, Virginia Tech — Solvent dynamics within biomolecular solvation layers play a major role in enzyme activity, but obtaining an accurate and quantitative picture of solvent activity around proteins is challenging. Due to the strong absorption of water in the gigahertz-to-terahertz frequencies, it is challenging to study properties of the solvent dynamics as well as conformational changes protein in water. We have developed a highly sensitive dielectric gigahertz-to-terahertz frequency-domain spectroscopy system for probing the collective dynamics of proteins and solvent. Using this technique, we investigate the complex dielectric response of bovine serum albumin and lysozyme proteins in aqueous environment on a wide frequency range from 0.1 GHz up to 2 THz. We explore the conformation flexibility of proteins and compare the hydration dynamics around proteins to understand the effects of surface-mediated solvent dynamics, relationships among different measures of interfacial solvent dynamics, and protein-mediated solvent dynamics.

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