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Sensitize hydration shells of ions by the dynamics of water with terahertz spectroscopy DEEPU GEORGE, JOHN RAHMANI, VINH NGUYEN, Dept of Physics, Virginia Tech University — Comparison of the relaxation dynamics of water in bulk state to that in a confined state is of significant importance to the study of interaction of biomolecules with its environment. In relation to this, the ability of terahertz dielectric spectroscopy to probe intermolecular dynamics has been explored in the past decade to look at the dynamics of water molecules which forms a hydration shell around proteins. The change in dynamics of water when its molecules interact with different types of solute molecules forms the basis of water-bio-molecular interaction. There have been several studies in the past looking at the effects of ion interactions with water molecules. In this study we have employed a vector network analyzer based terahertz dielectric spectrometer operating over the frequency range from 0.5 GHz to 1.1 THz to examine the water dynamics in several alkali metal chloride solutions. The terahertz dielectric response of these solutions as a function of concentration as well as the ion size has been studied. We have confirmed that for all these solutions the dynamics can be best described by a three Debye relaxation process of water. The relaxation times does not seem to depend on salt concentrations but on the other hand strength of relaxation modes is dependent on the molarity.

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