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**Probing second hydration shell of ionic solutions using Gigahertz to Terahertz spectroscopy** DEEPU GEORGE, CHOLA REGMI, SHENGFENG CHENG, NGUYEN VINH, Virginia Tech — Understanding the nature of ionic solvation sheds light into the role of ions in determining the activities of biomolecules in living environment. The dynamics of water around simple structures like ions may be a good starting point in understanding the dynamics of water around much more complex macro molecules. Here we expand on our previous studies on ionic solutions by further extending the radiation frequency region as well as by looking at ions with different sizes. Using two complimentary techniques which cover the frequency range from 6 GHz up to 3 THz, we have measured the femtosecond to picosecond dynamics of weakly bound waters around cations in the first group of the periodic table. By choosing solutions of chloride salts, we have kept the influence of anions the same while varying only the size of cations. Our results confirm our previous studies on pure water dynamics showing the existence of three different relaxation processes. While the relaxation times remain more or less the same, their amplitudes change with a change in salt concentration. Together with molecular dynamics, we give an estimation of the structure of the first as well as the second hydration shells of ions in liquid water.

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