

Terahertz spectroscopy of water

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Summary

Dynamical structure of water has been investigated extensively in the last decade using high frequency dielectric measurements, light-scattering experiments and infra-red spectroscopy. In contrast to a relaxational mode with the relaxation-time in gigahertz (GHz) region, water dynamics in terahertz (THz) region has been an unsolved problem because of experimental difficulties, although there are important intermolecular stretching and bending modes relating to hydrogen bond network in water. After establishment of terahertz time-domain reflection spectroscopy (THz-TDS), extensive efforts have been paid to clarify complex dielectric constants in water [1]. We proposed a novel time-domain attenuated total reflection (TD-ATR) technique [2,3] and applied the technique to many liquid systems [4-10]. In this talk, TD-ATR technique will be explained after brief description of THz-TDS. We also describe an analysis method to estimate hydration of water [4] and show several experimental results on water dynamics and hydration effects clarified by TD-ATR.

References

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