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Abstract

Dynamical Properties of Ice and Water: A Broadband Dielectric Spectroscopy Study †

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Though the mechanical properties of ice and water differ, they still have much in common from the dielectric spectroscopy viewpoint. We analyze the spectra of dynamical conductivity of solid and liquid water (see Figure 1) as a signature of their molecular dynamics. The dynamics of ice and water are considered on the same footing. We introduce a model [1] that provides a clear interpretation of the experimental conductivity and dielectric constant over fourteen orders of frequency magnitude, thus extending the scope of the existing models. The model links together infrared vibrations with static conductivity and dielectric constant, gives the interplay between the electrical and thermodynamic properties of ice and water, and provides a new dynamical vision on the old problem of the water structure.

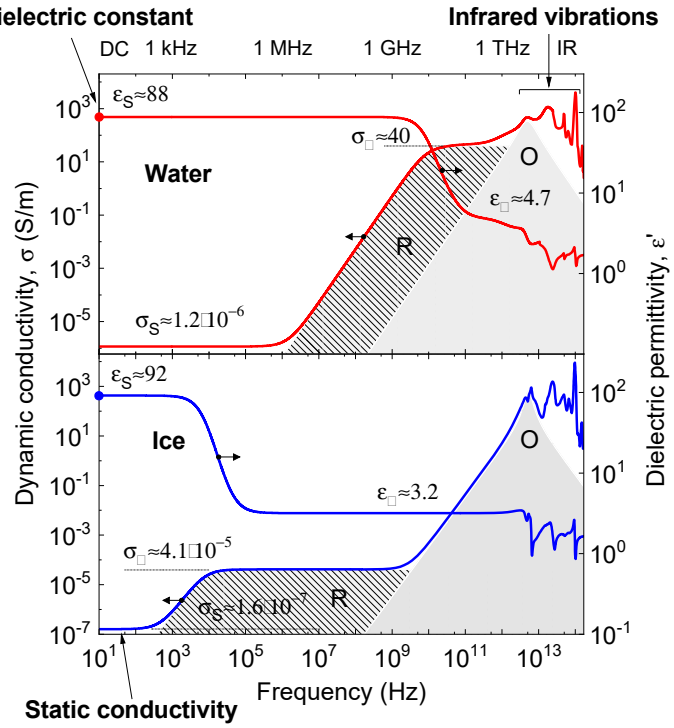

Figure 1. Broadband spectra of ice (blue) and water (red) in terms of dielectric permittivity (ε′) and electrical conductivity (σ).

Reference

1. Artemov, V.G. A unified mechanism for ice and water electrical conductivity from direct current to terahertz. *Phys. Chem. Chem. Phys.* **2019**, *21*, 8067–8072.