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Unraveling proton accommodation in water with cluster spectroscopy

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We describe how argon-nanomatrix spectroscopy, implemented with broadly tunable solid state infrared laser sources, allows us to establish how water networks flex and distort to accommodate elementary aqueous species like protons and electrons. We will focus on the hydrated proton, as this charge defect accounts for charge conduction in many biological processes that occur in a hydrophobic environment. By freezing the water clusters to their minimum energy structures, sharp, characteristic bands are recovered very low in energy that reveal how the local solvent arrangement dictates the spatial extent of the excess charge delocalization.