Photoemission from charged droplets

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Photoelectron velocity-map-imaging (VMI) studies on submicrometer-sized droplets have gained increasing importance for elucidating the properties of low-energy electrons in the condensed phase. An often neglected aspect of droplet VMI is the droplet charge. The presence of an additional electrostatic potential can modify electron transport and lead to a Coulomb barrier to electron escape. To explore and characterize the effects of positive and negative charges on low-energy electron transport we have performed a combined experimental and modeling study. To this end, photoelectron VMI spectra of size-selected droplets were recorded while varying the charge distribution in a controlled way. A probabilistic scattering model has been extended to include both classical and quantum effects of the electrostatic potential on the electron escape process. Good agreement between the experimental results and the extended scattering model is obtained.