POPULATION-MODULATION DYNAMICS IN WATER CLUSTERS USING VIBRATIONALLY MEDIATED TECHNIQUES

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We present a new methodology that allows interrogation of the melting points of the isomer classes in small molecular clusters. After infrared excitation of a portion of an initial population of cluster ions, this "bounce-back" technique allows for the extraction of the vibrationally excited clusters for subsequent probing of the resulting isomer distribution. Our example systems in this study are the water hexamer and heptamer anionic clusters, $(H_2O)_6^-$ and $(H_2O)_7^-$. We use photoelectron spectroscopy to characterize the isomer populations of these anions and their argon-tagged analogues via velocity-map imaging. Comparison of the isomer population distributions of these ions when formed directly in a supersonic expansion to those resulting from infrared predissociation of more highly argon-solvated clusters reveals population modulation dynamics.