

PROBING THE MOLECULAR DYNAMICS OF A $\text{Cu}(\text{CD}_3\text{OD})$ CLUSTER WITH PHOTODETACHMENT-PHOTOIONIZATION SPECTROSCOPY

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We report the femtosecond nuclear dynamics of neutral $\text{Cu}(\text{CD}_3\text{OD})$ van der Waals clusters, investigated using photodetachment-photoionization spectroscopy. Photodetachment of $\text{Cu}(\text{CD}_3\text{OD})$ anion with a 150 fs 400 nm laser pulse produces a vibrationally excited neutral complex that undergoes ligand reorientation and dissociation. The time evolving neutral is interrogated by delayed femtosecond resonant two photon ionization. This study shows that the nascent $\text{Cu}(\text{CD}_3\text{OD})$ complex dissociates on prompt (3 ps) and slower timescales (30 ps). The prompt component reflects direct dissociation upon photodetachment, while the slower dissociation arises from the coupling of CD_3OD molecular rotation into the $\text{Cu}-(\text{CD}_3\text{OD})$ dissociation coordinate. Theoretical investigations provide insight to the nature of the molecular dynamics which produce the observed dissociation characteristics.

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