PROBING THE MOLECULAR DYNAMICS OF A $Cu(CD_3OD)$ CLUSTER WITH PHOTODETACHMENT-PHOTOIONIZATION SPECTROSCOPY

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We report the femtosecond nuclear dynamics of neutral $Cu(CD_3OD)$ van der Waals clusters, investigated using photodetachment-photoionization spectroscopy. Photodetachment of $Cu(CD_3OD)$ 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 $Cu(CD_3OD)$ 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 Cu-(CD_3OD) dissociation coordinate. Theoretical investigations provide insight to the nature of the molecular dynamics which produce the observed dissociation characteristics.
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