Abstract Submitted
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Dynamics of Networked and Metal Cyanides[1] DANIEL WEIDINGER, DOUGLAS BROWN, CASSIDY HOUCHINS, JEFFREY OWRUTSKY — Time resolved IR spectroscopy was used to characterize the vibrational relaxation dynamics of the CN stretching bands of aqueous molecular metal cyanides and networked metal cyanides in reverse micelles and on surfaces. The vibrational and rotational relaxation dynamics of the CN stretching bands near 2000 cm^{-1} for aqueous molecular cyanides, $Au(CN)_2^-$, $Ag(CN)_2^-$, $Ni(CN)_4^{2-}$, $Pt(CN)_4^{2-}$, $Co(CN)_6^{3-}$, $Mn(CN)_6^{3-}$, and $Ru(CN)_6^{4-}$ have been investigated using ultrafast pump-probe spectroscopy. The spectra and dynamics of $Ru(CN)_6^{4-}$ are similar to those previously reported for ferrocyanide. The T_1 times are significantly longer (>30 ps) in the other molecules; $Mn(CN)_6^{3-}$ represents an intermediate case with a relaxation time of about 15 ps in water. The spectra and VER dynamics together extend the established theories of metal cyanide bonding and its connection to frequency and intensity. Networked metal cyanides in reverse micelles, including Prussian Blue and analogs with Cu, Ni, Co and Ru were also studied using visible pump-IR probe spectroscopy. Preliminary results suggest that networked metal cyanide VER lifetimes after visible pulse excitation are similar to those from infrared excitation.

[1]National Research Council and Naval Research Laboratory

Daniel Weidinger
Naval Research Laboratory

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