RAMAN SPECTROSCOPY OF URANOCENE AND THOROCENE UNDER LIQUID NITROGEN

S. HAGER and R. COMPTON, *Department of Physics, University of Tennessee, Knoxville, TN 37996*; J. ZAHARDIS and R. PAGNI, *Department of Chemistry, University of Tennessee, Knoxville, TN 37996*.

We report the utility of recording Raman spectra in which the sample is submerged under liquid nitrogen (Raman under nitrogen = RUN). The ro-vibrational cooling and insulation from an oxidizing atmosphere provide many advantages for RUN spectroscopy. As examples, RUN spectra of crystalline uranocene and thorocene (at 77 K) are reported using excitation from argon (5145 Å) and krypton (6764 Å) ion lasers. A number of new and well resolved vibrational transitions are observed. The assigned vibrational bands are compared to those of uranocene in THF, thorocene, and potassium cyclooctatetraenide. For uranocene, a broad polarizable band centered about 460 cm^{-1} was observed for Ar exitation. The 460 cm^{-1} band is greatly enhanced relative to the vibrational Raman transitions with excitation from the krypton ion laser, which is indicative of an electronic resonance Raman process as has been shown previously. The resonance electronic Raman band is observed to split into three distinct bands at 450, 461 and 474 cm^{-1} with 6764 Å excitation. Other examples (ferrocene, etc.) of RUN spectroscopy will be presented.