MATRIX ISOLATION SPECTROSCOPY OF UO_2Cl_2.

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A search for fluorescent transitions of UCl_4 was undertaken using samples that were isolated in solid Ar at 15K. Pulsed laser excitation was examined using the harmonics from an Nd/YAG laser (266 and 355 nm) and a dye laser operating in the 447-481 nm range. Several absorption and emission band systems were observed, with the emission spectra spanning the entire visible range. Fluorescence decay lifetimes were found to be either fast (a few hundred ns) or slow (tens of microseconds). Analysis of the vibrational progressions indicated that the carrier of these band systems was UO_2Cl_2, rather than UCl_4. Although present as a minor contaminant the UO_2Cl_2 clearly has a much higher fluorescence quantum yield than UCl_4. IR spectroscopy was used to confirm the presence of UO_2Cl_2 in the matrix (absorptions at 898 and 969 cm^{-1}). Assignment of the electronic transitions of UO_2Cl_2 is discussed in terms of the electronic structure of the ${UO_2}^{2+}$ sub-unit.