SPECTROSCOPIC INVESTIGATION OF URANIUM OXIDES ISOLATED IN SOLID Ar

JIN JIN, CHRIS J. LUE AND MICHAEL C. HEAVEN, *Department of Chemistry, Emory University, Atlanta, GA 30322*.

Laser-induced fluorescence spectra and infra-red absorptions have been recorded for matrix-isolated uranium oxides. Uranium oxide species were obtained by laser vaporization of a uranium metal target into a flow of Ar that contained a trace of O_2 (0.1%). Pulsed laser excitation was examined using the harmonics from an Nd/YAG laser (266 and 355 nm), an XeCl excimer laser (308 nm) and a dye laser operating in the 400-550 nm range. Several absorption and emission band systems were observed. The emission spectra were dominated by a nearly harmonic vibrational progression with a frequency of 850 cm^{-1}. In situ photolysis experiments indicate that UO_3 produces the observed fluorescence. Assignment of the electronic transitions of UO_3 is discussed in terms of the electronic structure of the 6 + oxidation state of uranium.