

SPECTROSCOPIC INVESTIGATION OF URANIUM OXIDES ISOLATED IN SOLID Ar

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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 O₂ (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 UO₃ produces the observed fluorescence. Assignment of the electronic transitions of UO₃ is discussed in terms of the electronic structure of the 6+ oxidation state of uranium.