FLUORESCENCE SPECTROSCOPY OF URANIUM FLUORIDE COMPOUNDS IN SOLID Ar

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Spectroscopic studies of uranium fluorides are being carried out to provide benchmark data for evaluating relativistic quantum chemical calculations. Matrix isolation techniques are being used to obtain survey spectra for a variety of UF_n (n$\leq$ 6) species. Initial experiments have focused on UF_6 and fragments produced by passing UF_6/Ar mixtures through a microwave discharge.

UF_6/Ar matrices were examined using 355 and 266 nm excitation. The former excites the A-X band, producing a long-lived (600μs) emission that spans the 408-435 nm range. This system has been characterized previously[a]. Excitation at 266 nm produced a new emission system in the 313-417 nm range with an upper state lifetime of 500 ns. This spectrum was dominated by a nearly harmonic progression with a frequency of 670 cm^{-1}. As 266 nm light is known to dissociate gas phase UF_6, the nature of the emitting state is in question.

Passage of the UF_6/Ar mixture through a microwave discharge prior to matrix deposition destroyed all of the hexafluoride (the matrices did not show the A-X or new emission bands described above). With 355 nm excitation a new system of emission bands was observed in the 427-500 nm range. These emissions are consistent with emissions from UF and/or UF_2.

Experiments to identify the carriers of the new band systems are in progress. A summary of the results will be presented.

[a] J. C. Miller, S. W. Allison and L. Andrews, J. Chem. Phys. 70, 3524 (1979).