PURE ROTATIONAL SPECTRA OF THE REACTION PRODUCTS OF LASER ABLATED THORIUM METAL AND OXYGEN MOLECULES ENTRAINED WITHIN SUPERSONIC EXPANSIONS OF NOBLE GASES

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Thorium metal has been laser ablated in the presence of pure oxygen entrained in high pressure argon. The products of the ablation event have been supersonically expanded into the Fabry-Pérot cavity of a time-domain microwave spectrometer. New measurements have been performed on thorium monoxide, where the J = 1 $\leftarrow$ 0 transition has been recorded in the v = 8, 9, and 10 vibrational levels. Further to this, a thorium-dependent spectral transition has been observed at 19251.8740(10) MHz. The carrier of this signal is to be determined, however, it requires an oxygen concentration of 0.1 % which is significantly higher than the optimal oxygen concentration required for observation of the thorium monoxide transitions. It is postulated that the presently unidentified thorium-containing compound is ThO_2 which has C_{2v} symmetry. Progress on the measurement of this spectra, together with other thorium experiments and supporting quantum chemical calculations, will be presented.