

## ROTATIONALLY RESOLVED IONIZATION SPECTROSCOPY OF DYSPROSIUM MONOXIDE, DyO

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Understanding of lanthanide (Ln) compounds is challenging due to their complex electronic structure, which results mostly from the open 4f (except Lu) shell of the Ln atoms. Here we report on the characterization of DyO and of DyO<sup>+</sup> in a supersonic molecular beam by applying a variety of spectroscopic approaches using different REMPI and PFI schemes, MATI, and (V)UV single-photon ionization. Isotopologue specific excitation schemes allow to obtain rotationally resolved spectra, and several Rydberg-series converging to the ionization limits of different rotational states of DyO<sup>+</sup> have been analyzed. The Rydberg series can be clearly assigned starting with the lowest  $J = 7.5$  state. Their vibrational autoionization – employing an infrared free electron laser – results in vibrational data for the cation. From the spectroscopic data obtained for the fermionic <sup>161</sup>DyO and the bosonic <sup>162</sup>DyO, the values of  $IE$  and  $D_0$  are determined with a high precision. This leads to the conclusion that the chemi-ionization reaction  $\text{Dy} + \text{O} \rightarrow \text{DyO}^+ + \text{e}^-$  clearly proceeds exothermic.