SPECTROSCOPIC INVESTIGATION OF A SERIES OF CERIUM-DOPED BORON CLUSTERS

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Rivaled, perhaps, only by its neighbor carbon, boron encompasses a unique and diverse swath of chemistry that lends itself to the adoption of extraordinary characteristics when complexed to metals. In recent years, metal-boride clusters have garnered attention for their potential application in a variety of fields including hydrogen storage and high energy density fuels. As inorganic ligands, these boron clusters tend to prefer multiply aromatic (σ - and π -) electronic configurations which may contribute to their unusual stability and unique properties. In the present study, a series of cerium-boride clusters were interrogated using anion photoelectron spectroscopy as a means of reconciling the presence of a series of mass coincident CeB_x^- (x=5-7) and CeO_2B_y^- (y=2-4) clusters as well as elucidating the electronic structure of the anionic and neutral species. Unlike previously studied cerium-oxide clusters, which typically have binding energies around 0.7-1.2 eV, the boride clusters have exhibited greater electron affinities between 1.0-2.0 eV. Moreover, the spectra collected show pronounced vibrational progressions that aid in the analysis of the clusters' molecular structure.