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X-ray absorption spectroscopy studies of $YMnO_3$, $HoMnO_3$, and $Y_{.4}Ho_{.6}MnO_3$ RELJA VASIC, North Carolina State University, DARIO ARENA, JOSEPH DVORAK, Brookhaven National Laboratory, HAIDONG D. ZHOU, CHRIS R. WIEBE, National High Magnetic Field Laboratory, GERALD LUCOVSKY, North Carolina State University, MARC ULRICH, Army Research Office — We have investigated three hexagonal perovskites, $YMnO_3$, $HoMnO_3$, and $Y_{.4}Ho_{.6}MnO_3$by O K_1 and Mn $L_{2,3}$ edge X-ray absorption spectroscopy. In $YMnO_3$ and $HoMnO_3$ the lowest energy features are predominantly Mn 4p and 3d states with a least five distinct states occurring at approximately the same X-ray energies in both samples. We associate this portion of electronic structure with the trigonal bipyramid bonding symmetry of a five-fold coordinated Mn. Higher energy transitions in the XAS OK_1 spectra are broader and associated with Ho 5d and Y 4d orbitals. Compared with $YMnO_3$ and $HoMnO_3$Mn 3d, and Ho 5d and Y 4d spectral features, the corresponding features in the$Y_{.4}Ho_{.6}MnO_3$ O K_1 spectrum exhibit broader features fewer in number. These are consistent with random alloy bonding in which the Ho and Y are randomly distributed on the A-atom sub-lattice. We will discuss the electronic structure of these empty states in the context of symmetry adapted linear combinations of molecular orbital O 2p*, and Mn 3d*, Ho 5d* and Y 4d* nearest neighbor states.

Relja Vasic
North Carolina State University

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