METALS IN BETA-RHOMBOHEDRAL BORON.* Joe Wong, Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550; Glen A. Slack, General Electric Corporate Research & Development, P.O. Box 8, Schenectady, N.Y. 12301.

The bonding and local atomic structure of a series of 3d metal-beta boron solid solution are investigated using a combination of x-ray absorption near-edge structure (XANES) and extended fine structure (EXAFS) technique utilizing intense synchrotron radiation as a light source. The corresponding metal diborides MB_2 , ($M = Sc, Ti, V, Cr$) were also measured and used to model the coordination environment of these metal sites in beta-boron.

As the d-states are progressively filled up in going across the 3d series from Ti to Cu, the pre-edge feature at 1-2 eV becomes less well-defined as is clear from the XANES of Mn, Fe, and almost disappears in the spectra of Co, Ni and Cu. The transition at 20 eV is strong and remains quite similar across the 3d series, as expected, since the final states are 4p in character, which are empty in all the 3d elements and is dipole allowed. It is noted that Cu exhibits a relatively narrower 4p transition at lower energy (17 eV).

The XANES spectral variation are also studied as a function of dopant concentration for the case of Ti, V, Cr, Fe, Co, Ni and Cu. Finally, doubly doped (V/Cu) system is studied and compared with the singly-doped V and Cu materials.

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