Joint 20th AIRAPT – 43th EHPRG, June 27 – July 1, Karlsruhe/Germany 2005

Pressure influence on magnetism in uranium intermetallics

V. Sechovský, L. Havela, Charles University, Prague, sech@mag.mff.cuni.cz
F. Honda, Advanced Science Research Center, JAERI, Tokai
A.V. Andreev, Z. Arnold, J. Kamarád, Institute of Physics ASCR, Prague
K. Prokeš, Hahn-Meitner-Institute, BENSC, Berlin
G. Oomi, Kyushu University, Fukuoka

The complex evolution of 5f-electron magnetism within U intermetallics is controlled by interactions of the U 5f electrons with valence electrons of ligands. The 5f electron orbitals are extended in space and therefore their overlap with the neighboring U 5f-orbitals and the non-U ligand valence electron wave functions (yielding a considerable 5f-ligand hybridization). These mechanisms play a dual role in determining 5f-electron magnetism in U intermetallics. The only "clean" way how to control the interatomic distances is realized by external pressure acting on the studied material. Good knowledge of the compressibility, which is frequently anisotropic, is crucial for detailed microscopic interpretation of data. These aspects will be systematically demonstrated by experimental results available for several prominent representatives of the large family of U intermetallics. Special aspects of for different types of pressure experiments (hydrostatic pressure, uniaxial stress) will be also addressed. A more general scenario relating the electronic structure and the 5f-electron magnetism will be finally presented.