ABSTRACT CODE

Photoemission investigation of AnSb and AnTe single crystals (An= U, Np, Pu)

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We have performed photoemission experiments, both with the HeI (21.2 eV) and HeII (40.8 eV) emission lines and the laser plasma light source (LPLS) giving energies in the range 40 – 80 eV, on laser-cleaned surfaces of single crystals of the AnSb and AnTe series. This extends earlier work [1] reported on NpSb and, together with published results from USb and UTe [2, 3], allows us to study the systematics of the electronic structures of these compounds. Direct comaprisons within the series are possible due to the highly symmetric simple NaCl crystal structure of monopnictides and monochalcogenides.

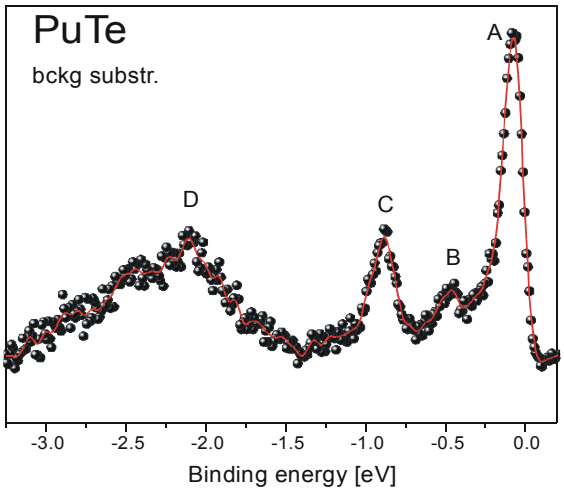

Fig. 1. Single crystal PuTe spectrum taken at 40.8 eV photon energy, surface cleaned in UHV by laser ablation, excellent agreement with work performed on thin layers of PuSe by Gouder et al [4].

An example of a PuTe spectrum with a "four peak manifold" is shown in Fig. 1. The photon energy dependence was investigated for photon energies: 40.8eV, 48.4eV, 60eV and 76eV. We find that the PuTe spectral features are insensitive to photon energy. As can be seen in Fig 2, there are no differences between the 40.8 and 76eV scans other than broadening related to experimental resolution. Distinct systematics of the main 5f peak position and electron count (Fig. 3.) and Neel temperature is found within the series.

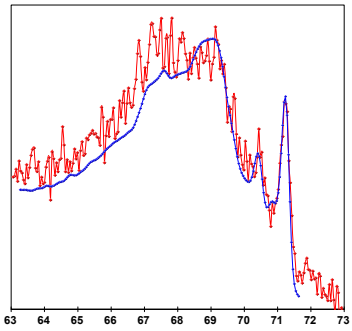

Fig. 2. The 40.8 eV PuTe scan (line) is gaussian-broadened here to simulate the 76eV resolution from LPLS (raw data line + points).

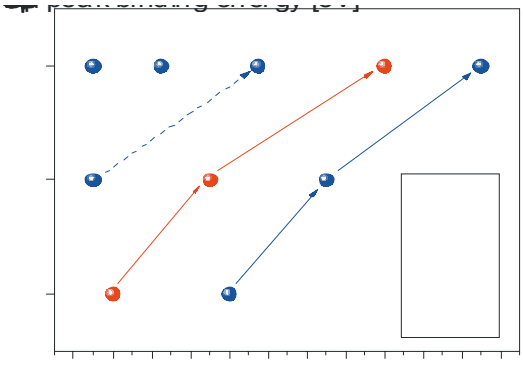

Fig. 3. The 5f peak binding energy is related to the number of 5f electrons in An and 5p electrons in Sb and Te, respectively.

References:
[1] A. J. Arko et al., Phys. Rev. B **62**, 1773 (2000)
[2] B. Reihl et al., Phys. Rev. B **26**, 1842 (1982)
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[4] T. Gouder et al., Phys. Rev. Lett. **84**, 3378 (2000)