

High Resolution Photoelectron Spectroscopy of Pu at the Advanced Light Source

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High resolution photoelectron spectroscopy of Pu has been performed at the Spectromicroscopy Facility (Beamline 7.0) at the Advanced Light Source in Berkeley. Based upon an initial analysis of the data, two key results are immediately obvious. (1) The 5d-5f Resonant Photoemission of the Pu 5f levels exhibits a dependence upon the Pu phase and structure. For example, the results from alpha and delta Pu differ significantly. This strongly suggests that electronic behavior is linked to atomic ordering and structure in Pu. (2) Contamination with oxygen and carbon may be more insidious and subtle than initially believed. Photoemission measurements at a photon energy of 800eV exhibit oxygen and carbon core level peaks, while the same sample shows no contamination utilizing a photon energy of 1253eV, a typical laboratory source energy used in ECSA machines (i.e., Mg k-alpha). In other words, what was thought to be "clean" may not have been. Furthermore, contamination issues like these have a crucial impact upon interpretation of Pu core level spectra, e.g. localized and delocalized screening by 5f electrons. Additionally, 5f-6p Resonant Photoemission, core level spectra (particularly the Pu 4f's), and X-Ray absorption data, all from the Pu, were obtained. Future ideas include studying magnetic effects in Pu.

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