Contribution ID: **7** Type: **Oral**

The absence of chemical sensitivity in the 4d and 5d X-ray absorption spectroscopy of uranium compounds

Tuesday 20 May 2014 14:20 (35 minutes)

Recently, X-ray absorption spectroscopy (XAS) and related derivative measurements have been used to demonstrate the Pu 5f states are strongly relativistic and have a 5f occupation number near 5. [1] Owing to the success in this regime, it has been argued that the XAS measurements should be a powerful tool to probe 5f occupation variation, both as a function of elemental nature (actinide atomic number) and as a function of physical and chemical perturbation, e.g. oxidation state. It will be shown here that XAS and its related measurements fail in this latter aspect for a wide variety of uranium compounds and materials. [2-9] Possible causes will be discussed.

Acknowledgements

Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344. This work was supported by the DOE Office of Science, Office of Basic Energy Science, Division of Materials Science and Engineering. JGT wishes to thank Professor Guenter Kaindl for his critical reading of the manuscript and use of his XAS data.

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Session Classification: Solid State Chemistry and Physics of the Actinides

Track Classification: Solid State Chemistry and Physics of the Actinides