



Contribution ID: 54

Type: **Poster**

## **230Th - 234U Thorium Radiochronometry Method Comparison: A Tri-Lateral Round-Robin Exercise**

*Wednesday, 9 July 2014 13:00 (1 hour)*

Radiochronometry methods can provide valuable forensic information for determining the source and processing time frame of nuclear materials. One method used to determine the age of uranium materials is based on the  $^{230}\text{Th}$  and  $^{234}\text{U}$  radiochronometry pair. If two assumptions hold, 1) a complete Th/U separation during nuclear material processing and, 2) a closed isotope system between the time of material processing and sample analysis, the comparison of  $^{230}\text{Th}$  and  $^{234}\text{U}$  abundances in a material can provide the time elapsed since processing, or age of the material. The analytical methods used by the laboratories who participated in this round-robin exercise were based on isotope dilution mass spectrometry, which involves spiking the dissolved sample with a high purity Th and U isotope of known concentration that is of no interest analytically. Thorium and uranium were then separated, purified, and analyzed by mass spectrometry. Reliability and consistency of data generated using these methods is critical and often challenging due to the current lack of availability of appropriate isotope dilution standards that have been certified by mass, not activity. The collaborations currently underway between the US DOE laboratories (LANL and LLNL), CEA and JAEA are focused on developing consistency in standardization of both the  $^{229}\text{Th}$  and  $^{233}\text{U}$  isotope dilution standards used to quantify the  $^{230}\text{Th}$  and  $^{234}\text{U}$  isotopes for radiochronometry. The approaches and data associated with these standardization measurements will be presented. Additionally, a comparison of the analytical methods applied to determine uranium material ages along with results for the age dating of the uranium standard reference material NBS U050 will be included.

LA-UR 13-29188

### **Country and/or Institution**

Los Alamos National Laboratory

**Primary author:** Dr STEINER, R. (United States of America)

**Co-authors:** Dr GAFFNEY, A. (Lawrence Livermore National Laboratory, USA); Dr HUBERT, A. (CEA, DAM, France); Dr OKUBO, A. (Japanese Atomic Energy Agency); Dr POINTURIER, F. (CEA, DAM, France); Ms SCHORZMAN, K. (Schorzman); Dr MAGARA, M. (Japanese Atomic Energy Agency); Dr WILLIAMS, R. (Lawrence Livermore National Laboratory, USA); Dr KINMAN, W. (Los Alamos National Laboratory, USA)

**Presenter:** Dr STEINER, R. (United States of America)

**Session Classification:** Poster Session II