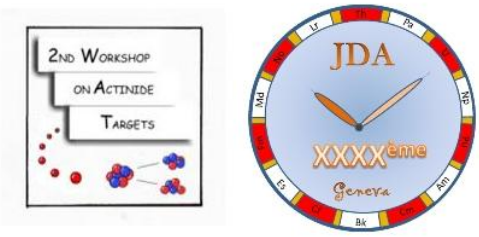

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Actinide Target Use at ATLAS

Thursday 1 April 2010 10:00 (30 minutes)

Molecular plating provides an efficient method to prepare sources and targets of actinide elements on thick and thin backings. These are required for experiments at the Argonne Tandem Linac Accelerator System (ATLAS) heavy-ion accelerator. Although the technique is simple and fairly reproducible, because of the radioactive nature of the targets, it is vital to record the various parameters employed during the preparation process. At Argonne National Laboratory, 200-500 μg/cm2 thick actinide targets were required for Coulomb Excitation (COULEX) studies involving GAMMASPHERE. These targets were plated on 50 mg/cm2 Au backings and were subsequently covered by a 200 μg/cm2 Au foil in order to capture any material lost by sputtering. Targets of 230Th, 237Np, 239, 240, 242, 244Pu, 241Am, 248Cm, and 249Cf were prepared by dissolving the material in isopropyl alcohol and electroplating the actinide ions by applying a potential of 600 V. The amount of material in the target was determined by alpha particle counting and gamma-ray spectroscopy. Many laboratories routinely prepare these targets on thick backings using this technique. However, it becomes more difficult when employing thin backings (i.e. less than 1 mg/cm2). In recent years, we have plated targets on, for example, thin Ni and carbon backings. The Ni foils, evaporated on a copper substrate, are purchased commercially. We used these foils to plate 234U. Afterwards we removed the copper by acid dissolution. In this way 400 μg/cm2 234U targets were prepared on a 200 μg/cm2 Ni backing. Another application involved preparation of a 100 μg/cm2 243Am target by plating onto a commercially available 75 μg/cm2 carbon film left on its glass substrate for subsequent floating. A column made of Delrin™ was used which did not produce any scratches on the carbon film surface. Details of the technique as well as future prospects will be presented.

(Delrin™ is a registered trademark of E. I. du Pont de Nemours and Company)

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