Contribution ID: **26** Type: **Oral**

Preparation and Characterization of 10B Targets at JRC-Geel

Tuesday, 9 October 2018 15:40 (20 minutes)

Measurements of neutron-induced cross sections to generate nuclear data are a core activity of the JRC-Directorate G for Nuclear Safety and Security in Geel. Thin 10B layers are of great importance in this activity as they are used to measure the absolute neutron flux in the beam by means of the 10B(n,α)7Li reaction cross-section as standard reference. After a period of reduced activity and in line with a renewed interest for nuclear data, the demand for high quality 10B targets increased. In this paper we describe the design and features of a new e-beam evaporator specifically customized for the preparation of boron targets as replacement of the old dysfunctional equipment. Several 10B targets of varying thicknesses were prepared and characterized as part of the factory acceptance tests and implementation in the JRC-Geel target preparation laboratory. Differential substitution weighing was applied for mass determination and in order to calibrate the thickness monitor. Comparative time of flight measurements relative to 10B and 235U standard targets were conducted in the GELINA accelerator facility at the JRC-Geel site as second methodology for the determination of 10B areal density. The morphology of the layers was assessed by means of Scanning Electron Microscopy (SEM). The determination of impurities was realized by means of Energy Dispersive X-ray (EDX). Finally, two boron targets were prepared in the frame of the measurement of the neutron induced fission cross-section of 230Th at the neutron time-of-flight facility in CERN.

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Session Classification: Session 3- Thin Films and Foild Preperation and Techniques

Track Classification: 1 - Thin films and foils preparation techniques