

Preparation and Characterization of ^{10}B Targets at JRC-Geel

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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 ^{10}B 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 $^{10}\text{B}(n,\alpha)^7\text{Li}$ 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 ^{10}B 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 ^{10}B 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 ^{10}B and ^{235}U standard targets were conducted in the GELINA accelerator facility at the JRC-Geel site as second methodology for the determination of ^{10}B 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 ^{230}Th at the neutron time-of-flight facility in CERN.

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