

Advanced SiC and Al₂O₃ as model targets for radioisotope beam production at HIE-ISOLDE

Monday 17 December 2012 18:05 (1h 25m)

A search of new target materials showing better mechanical characteristics and release properties of radioisotopes is one of the aims of the HIE-ISOLDE project.

It has been already proven that by controlling the microstructure of a target material in terms of grain size down to 50 nm, and porosity its release properties can be altered. On the other hand such changes also influence its mechanical properties which in turn can change their aging behavior. This investigation needs to be described more thoroughly before any modification is introduced in the design of HIE-ISOLDE targets.

The first goal of this study is the synthesis of two model materials from the groups of carbides and oxides (i.e. silicon carbide and alumina) with the ice-templating technique which permits controlling pore formation conditions within the material. So-prepared silicon carbide and alumina present well-defined open uniaxial porosity of defined pore size and fraction.

The second goal of this study is the preparation of the irradiation of produced targets at two CERN facilities, at ISOLDE and at HiRadMat, which use proton beams of two different energies, 1.4 GeV and 450 GeV respectively. This study comprises calculations of isotope production and energy deposition using Fluka and Abrabla codes, as well as thermo-mechanical using simulations ANSYS workbench v. 14 to verify the mechanical integrity of the material under irradiation.

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Session Classification: Poster session