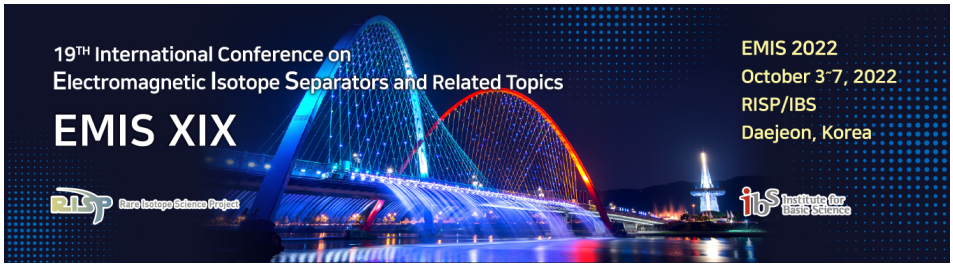

Contribution ID: **25** Type: **Poster Session**

On the feasibility of online terbium extraction at ISOL@MYRRHA.

Monday, October 3, 2022 7:26 PM (8 minutes)

Terbium is an element that has four isotopes with interesting properties for medical applications, ^{149,152,155,161}Tb[1]. These radioisotopes are however far from being sufficiently accessible, thereby hindering the pursuit of research on radiolabelling as well as clinical or preclinical investigations. Their lack of market availability is explained by difficulties in producing these radioisotopes with high purity and specific activity. While ^{161}Tb can be produced using neutron capture in nuclear reactors the other isotopes require other production pathways which are not yet fully developed for large scale production[2]. For ^{149,152,155}Tb, a production route involving the ISOL technique is under study within the Tb-IRMA-V project, from a consortium between SCK CEN, KU Leuven and CERN with the aim towards producing terbium based radiopharmaceuticals. The ongoing R&D towards the production and extraction of these isotopes from an ISOL target at the ISOL@MYRRHA facility will be covered in this contribution.

As a first step in developing the ISOL technique for the production of Tb radioisotopes, different possible target material candidates have been investigated and the most suitable target materials have been identified by comparing cross sections of these target materials as well as their vapour pressures as compared to the isotopes of interest. In a second step, the release of Tb radioisotopes or their precursors from the identified target materials have been studied. The purpose of this was to release as much of the isotope of interest as possible, while maintaining a high degree of selectivity to keep other releases to a minimum. The following techniques and their merits were considered: 1- isotope release with molecular sidebands 2- separation inside a temperature-controlled transfer-line, using differences in adsorption enthalpy. Combined, these studies allow to estimate the production capacity of the neutron-deficient Tb radioisotopes at the ISOL@MYRRHA facility.

[1] C. Müller et al, A unique matched quadruplet of terbium radioisotopes for PET and SPECT and for α- and β-radionuclide therapy: an in vivo proof-of-concept study with a new receptor-targeted folate derivative, Journal of Nuclear Medicine, December 2012, 53 (12) 1951-1959; DOI: https://doi.org/10.2967/jnumed.112.107540

[2] Nabanita Naskar and Susanta Lahiri, Theranostic Terbium Radioisotopes: Challenges in Production for Clinical Application, Frontiers in Medicine, May 2021, DOI: https://doi.org/10.3389/fmed.2021.675014

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Session Classification: Poster Session