



Contribution ID: 20

Type: MEDICIS-Promed ESRs

Oxidation of uranium carbide targets at ISOLDE and radiochemistry infrastructures for the production of medical isotopes at MEDICIS

Saturday, 4 May 2019 10:30 (20 minutes)

The Isotope Separator On-Line DEvice ISOLDE is a facility dedicated to the production of radioactive ion beams at CERN. With over 50 years of experience, ISOLDE is able to deliver more than 1000 different isotopes of 74 chemical elements used for experiments in various fields such as nuclear and atomic physics, material science and nuclear medicine.

Radionuclides are produced by irradiating thick targets made of refractory materials such as highly porous depleted uranium carbide with excess graphite (UC_x). The microstructure of uranium-based materials was engineered to increase the isotope release efficiency. Due to their pyrophoric nature, UC_x materials require extreme care in all handling procedures and are unsuitable in this form for long-term storage. Investments in new equipment have been made to investigate a safe and efficient process for the conversion of UC_x into oxide. The procedures developed here could be transferred to other facilities worldwide, as a new waste disposal channel.

In the frame of the MEDICIS-Promed fellowship programme, infrastructures have been put in place for the safe collection, radiochemical process developments, packaging, and shipping of radioisotopes. The laboratory is expected to commission its radiochemical operations in spring 2019.

In this contribution, the oxidation kinetics of the next generation UC_x target materials which depends highly on the starting microstructure will be discussed, and a layout of the MEDICIS laboratory will be presented.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 642889.

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Session Classification: Devices and Engineering for Radioisotopes Handling

Track Classification: Devices and Engineering for Radioisotope Handling