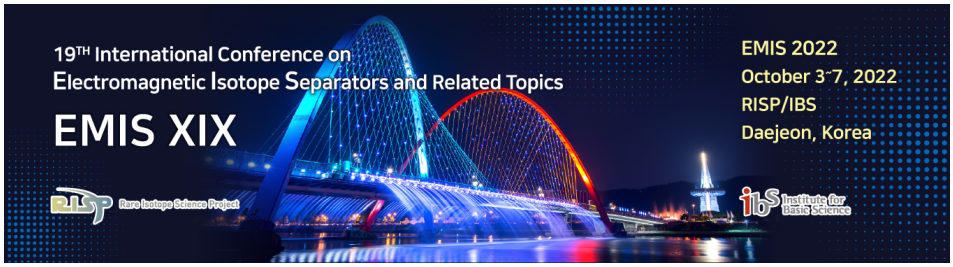


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# Parasitic material irradiation damage studies at ISAC/TRIUMF

*Monday, 3 October 2022 20:22 (8 minutes)*

The high-power driver beams of future accelerator facilities pose thermomechanical challenges for the design of beam intercepting components that need to dissipate increased power densities and sustain higher radiation damage levels. Additionally, target components and adjacent materials will also suffer from high fluxes of ionizing radiation, often degrading critical mechanical properties. In RIB facilities, new target stations will need to use novel designs and materials in order to enhance yields and exploit the increased isotope production rates from high-power driver beams. Usually, no experimental data is available for the evolution of material properties in these conditions. In this context, the use of parasitic irradiations in already existing RIB facilities, as well as future high-power facilities offer a relevant and efficient test methodology.
TRIUMF's main cyclotron delivers 480 MeV, ≤ 100 μA proton beams (6.25 x 1014 protons/second) to the Isotope Separator and Accelerator facility (ISAC) for the production and delivery of RIBs by the ISOL method. The RIB targets have a total stopping power of only 50-80 MeV resulting in a residual high-power proton beam downstream of the target. A material sample irradiation setup has been developed and commissioned to parasitically irradiate material candidates for proton beam windows, as well as de-novo design material candidates for enhanced resilience to radiation damage, while another setup off beam is used to irradiate vacuum seals and polymeric materials for future ARIEL targets and other high-power accelerator applications.
The commissioning methodology and the experience gained with the irradiation and manipulation of parasitic attachments at ISAC will be presented together with collected results this far.

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