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Procedure for the SEM analysis of irradiated target material.

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For the production of radioactive ion beams with the ISOL method, a target material is irradiated with a high energy driver beam that induces nuclear reactions and produces isotopes. This process consequently leads to the deterioration of the target material.

The characterization of post irradiated target materials provides information about the level of sintering the target material suffers during irradiation. Systematically observing the same type of material submitted to different irradiation conditions will allow the development of materials with greater endurance.

In contrast with other laboratories where the scanning electron microscope (SEM) is in their shielded nuclear radiation containment chambers, in TRIUMF, the SEM is in a separated room. At TRIUMF we observe different target materials previous irradiation with the in house SEM, therefore to use the same SEM to analyze post irradiated target material it is crucial to guaranty the safety of not only the personnel during the analysis of the irradiated target materials but also the safety of the already established SEM users. That is why a procedure for the analysis of target materials is being developed.

The procedure for the analysis of the material includes the retrieval of the irradiated target material, its transportation from the shielded nuclear radiation containment chambers to the SEM room, and it also comprehends the installation of the sample in the SEM. Additionally, the procedure covers the disposing of the sample and the safety measurements in case of contamination.

Implementing this procedure as part of the target quality control will provide the baseline data for the synthesis of tailored target materials with enhanced isotope diffusion.

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