Feasibility of High Power Refractory Metal-Foil Targets for EURISOL

R. Wilfinger[1], J. Lettry[1] and the EURISOL Task 3 Workgroup

[1] *CERN, European Organization for Nuclear Research, CH-1211 Genève 23, Switzerland*

Radioisotopes are produced by the ISOL method in thick targets. In existing ISOL facilities, only small yields have been obtained for short-lived nuclei close to the driplines due to radioactive decay during diffusion, effusion and ionization processes. An increase of the proton beam current increases the production rate, which is directly proportional to the primary proton flux, but also increases the power deposition inside the target. Therefore, the internal structure of high-power refractory metal-foil targets for the future EURISOL facility has to be carefully optimized to improve the production rate, the power dissipation, the structural strength and the fast release of radioisotopes to obtain high yields for short-lived alkali and rare earth isotopes.

EURISOL foil-targets have to withstand a primary proton beam of 1 GeV kinetic energy and up to 100 μA beam current. These foil targets will be based on previous high-power target concepts, i.e. the RIST target [1] or high power targets used at TRIUMF [2, 3]. A single target unit is capable of dissipating up to 25 kW, hence, several target units can be merged together by individual transfer lines to one common ion source. The single target units will be irradiated by a proton beam in time sharing mode to distribute the primary proton beam current to the individual target units.

In this feasibility study the necessary properties of high-power foil targets are discussed and the requirements to design a foil target according to the proton beam parameters [4] for the future EURISOL facility are given.

We acknowledge the financial support of the EC under the FP6 “Research Infrastructure Action — Structuring the European Research Area” EURISOL DS Project, Contract No. 515768 RIDS.

References

[1] J. R. J. Bennett, C. J. Densham, P. V. Drumm, W. R. Evans, M. Holding, G. R. Murdoch, and V. Panteleev. The design and development of the RIST target. *Nuclear Instruments and Methods in Physics Research B*, 126:117–120, 1997.

[2] P. Bricault, M. Dombsky, A. Dowling, and M. Lane. High power target developments at ISAC. *Nuclear Instruments and Methods in Physics Research B*, 204:319–324, 2003.

[3] M. Dombsky, P. Bricault, P. Schmor, and M. Lane. ISAC target operation with high proton currents. *Nuclear Instruments and Methods in Physics Research B*, 204:191–196, 2003.

[4] EURISOL-DS Task 3, *100 kW Direct Target Station Homepage*, Table of Baseline Parameters. http://ab-project-eurisol-ds-direct-target.web.cern.ch/ab-project-eurisol-ds-direct-target/, February 2006.