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Thermal transport in ISOL target materials

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The ISOL method (Isotope Separation On-Line) is used worldwide to advance research in multiple fields, including medicine, astrophysics, materials science, and fundamental particle physics by producing radioactive isotopes. The nuclides of interest are created by directly irradiating a target material with accelerated particles. During operation, the target material must sustain temperatures around 2000°C while withstanding continuous thermal loads from interactions with the incident beam. The thermal limits of the target material restrict operation and target lifetime. Thermal properties are therefore of significant interest in target materials development.

In this work, the thermal challenges facing ISOL target materials are discussed. The mechanisms of heat transport through target materials are studied and an off-line method is developed for studying target material thermal transport properties. The optimization of target material microstructures to enhance thermal transport is briefly discussed.

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