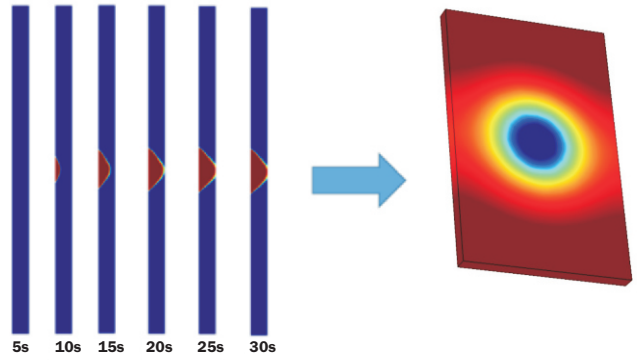
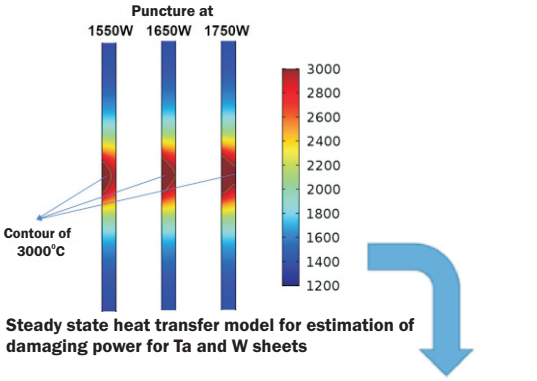
Evaluation of Crucible for Cold Hearth Transverse Electron Beam Vapour Generator

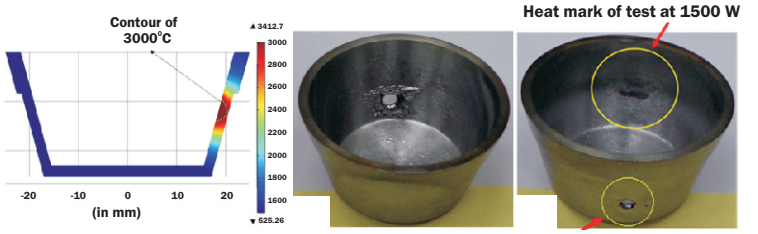


Transient numerical model for damage of 2mm Ta sheet: estimation of steady state

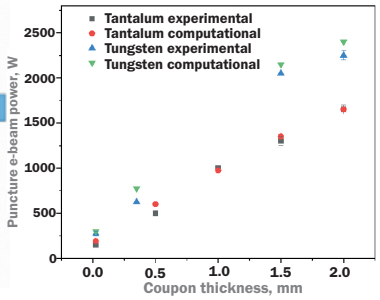


Steady state heat transfer model for estimation of damaging power for Ta and W sheets

Comparison of experimental and computational puncture power for tantalum and tungsten



Numerical prediction and experimental validation for crucible geometry



Validation of thermal model with experiments

***Dileep Kumar V., Anik Mazumder, Nagraj Alangi, Jaya Mukherjee and Sanjay Sethi**

For e-beam evaporation in laser-based isotope separation process, the wall thickness and material of the crucible for safe operation has been assessed in this study.

A 270° bend e-beam evaporator is generally used as a vapour generator for laser-based isotope separation process. In such an evaporator a condition is imminent where direct impingement of the beam on crucible wall happens when charge level is less than a critical level during continuous operation. Hence, electron guns are susceptible to safety issues related to direct impingement of electron beam. The objective of this study was to identify a crucible material of desired wall thickness to produce vapour of a metal which requires 1500W to achieve desired vapour for laser-based isotope separation process. The study was reported in a recently published journal paper (Kumar, D *et al.*, *Case Stud. Therm. Eng.*, 2021, **27**, 101318). In this study, tantalum and tungsten were investigated as candidate crucible materials experimentally. Experiments were carried out on Tantalum and Tungsten discs of different thickness to obtain the damaging power in case of direct impingement. Puncture power was numerically estimated. The simulation results are in good agreement with the experimental results.

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