



University of
Sheffield

Poster 4

Exploration of using ferrous alloys as radiation damage resistant materials for fusion



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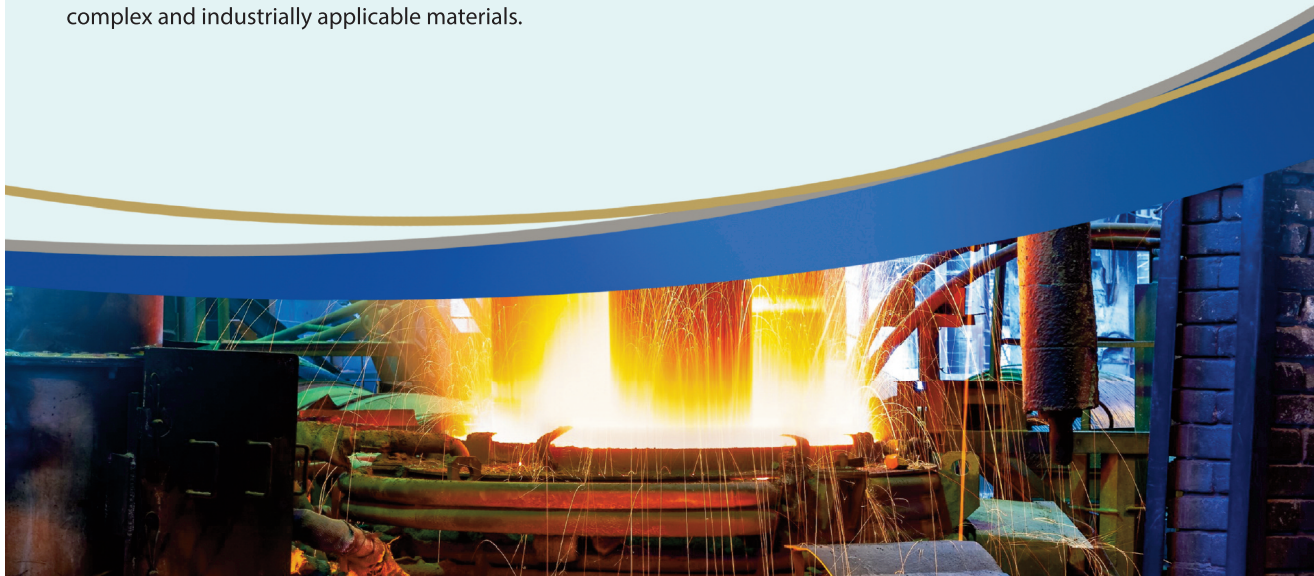
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ABSTRACT:

Fusion energy offers great potential for zero carbon power, but poses severe challenges for materials. This work explores the effects of the life-limiting factors on breeder blanket structural materials and aims to expand the operational window of current steel options. This work produces and investigates Fe-based model alloys with varying levels Mn and Si. Mn and Si have been found to contribute to irradiation induced degradation and enhance clustering effects. Transmission electron microscopy (TEM) and atom probe tomography (APT) will be used to determine the formation location and size of these clusters, particularly their vicinity to irradiation induced defects and dislocation loops. Upon irradiation, the impact of Mn and Si clusters on embrittlement at low temperatures and swelling at high temperatures will be analysed. Verification of critical contents of Mn and Si will then allow compositions to be developed further into more complex and industrially applicable materials.



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