

Plasma Materials Interactions & Diagnostics Symposium



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Advancing Fusion Materials: Case Studies in Characterization by NCBJ

Developing materials for fusion technologies is a critical component in advancing fusion development and facilitating its commercial application. Among the key challenges in this process is the need to preselect and rigorously test materials that can withstand the extreme conditions within a fusion reactor. To address this challenge, advanced materials such as Oxide Dispersion Strengthened (ODS) and Reduced Activation Ferritic-Martensitic (RAFM) steels are being explored for their promising properties in fusion applications. The successful integration of these materials necessitates a multifaceted approach, encompassing material selection, optimization of production processes, and refinement of fabrication techniques.

The presentation looks at real examples from NCBJ, where we've tested fusion materials. Examples include the assessment of electron beam welded joints in EUROFER97 blocks (incorporating non-destructive testing methods) and the mechanical analysis of Fe-14%Cr-based ODS steel manufactured by Hot Isostatic Pressing (HIP). Both investigations aim to contribute to the overall goal of developing robust methodologies for material testing and optimizing the production of fusion reactor components.

Moreover, the adaptation of mechanical testing methods to the unique demands of fusion applications necessitates the development of specialized protocols and methodologies. The presentation underscores NCBJ's research capabilities, showcasing the exploration and understanding of material behaviours under diverse conditions, including high temperatures. A part of this presentation will focus on the launch of NCBJ's small-scale mechanical lab, which will serve as a crucial platform for advancing our understanding of fusion materials and their mechanical properties.

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