SUMMER 2024

MSE SEMINAR

FRIDAY, AUGUST 2ND | 11:00AM | ARMS 1021

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"Irradiation-Induced Defect Characteristics and Hardening Behaviour of Oxide-dispersion Strengthened Concentrated Solid Solution Alloys"

Abstract:

Due to the extreme service conditions, the structural material discovery for high-temperature irradiation applications is challenging. The current work explored an innovative approach involving nano oxide dispersion strengthened-concentrated solid solution alloys (ODS-CSAs) with nanosized grains to address the challenge. We demonstrate the efficacy of this approach in ODS-NiCoFe and ODS-NiCoFeCr alloys as model materials, which were irradiated with Ni^{2+} ions at 580℃. We studied the characteristics of irradiation-induced defects such as voids and dislocations via transmission electron microscopy (TEM) and scanning TEM. In addition, we calculated nano-hardness values from the pristine and irradiation regions of the materials via the nanoindentation technique. Our study correlated the defect characteristics with the irradiation-hardening behavior of the alloys. Our analysis also reveals the changes in the defect and hardening behavior with compositional changes in the alloys. We will present all such findings, which divulge the high-temperature radiation resistance of the novel ODS-CSAs, and present a state-of-the-art strategy for designing structural materials.

Biography:

Dr. Sri Tapaswi Nori received his Ph.D. in 2021 from Purdue University, USA. He worked with Prof. Maria Okuniewski on the topic of three-dimensional characterization of high-temperature ultra-fine precipitate strengthened steel following neutron irradiation. He later joined the NOMATEN Centre of Excellence, National Centre for Nuclear Research (NCBJ), as an Assistant Professor/post-doctoral researcher, where he is currently working. His research is focused mainly on the assessment of microstructure and mechanical properties of structural materials such as the concentrated solid solution alloys for nuclear applications. He is experienced in material characterization via techniques such as scanning and transmission electron microscopy and synchrotron X-ray-based diffraction and spectroscopy. He won several research grants such as the ESTEEM3 project, OFFER project, synchrotron experiments at DESY, Diamond Light source, Joint Research Centre open proposal, Nuclear Science User Facilities Rapid Turn-Around Experiment, and Center for Integrated Nanotechnologies user proposal.

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