NOMATEN Online Seminar

Time: 1 PM
Location: gotomeeting room - https://meet.goto.com/NCBJmeetings/nomaten-seminar
Seminar date: April 16th, 2024

Title: Irradiation effects in Oxide Dispersion Strengthened (ODS) steels
Speaker name: Dr. Joel Ribis
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Abstract: Oxide dispersion-strengthened materials are reinforced by a (Y, Ti, O) nano-oxide dispersion and thus can be considered as nanostructured materials. Designed to serve in extreme environment – i.e., a nuclear power plant – the challenge for ODS steels is to preserve the nano-oxide dispersion under irradiation in order to maintain the excellent creep properties of the alloy in the reactor. Under irradiation, the nano-oxides exhibit different behaviour as a function of the temperature [1]. At low temperature, the nano-oxides tend to dissolve owing to the frequent ballistic ejection of the solute atoms. At medium temperature, the thermal diffusion balances the ballistic dissolution, and the nano-oxides display an apparent stability. At high temperature, the nano-oxides start to coarsen, resulting in an increase in their size and a decrease in their number density [2, 3]. In this talk the different irradiation response of the nano-oxides will be developed and detailed.

[1] J. Ribis et al., *Nano-structured materials under irradiation : Oxide Dispersion-Strengthened steels*, nanomaterials 11 (2021) 2590.
[2] M-L Lescoat et al., *Radiation-induced Ostwald ripening in Oxide Dispersion-Strengthened ferritic steels irradiated at high ion dose*, Acta Mater. 78 (2014) 328.
[3] J. Ribis et al., Comparison of the neutron and ion irradiation response of nano-oxides in Oxide Dispersion Strengthened materials, J. Mater. Res. 30 (2015) 2210.

Bio: Joël Ribis is a research engineer at the French Alternatives Energy and Atomic Energy Commission (CEA) with research expertise in nuclear materials science, and a specialization in irradiation effects. He has been working in ODS steels for many years, more precisely in the comprehension of the microstructure of the as-received materials as well as the irradiation effects that those materials undergo when subjected to both neutron and ion irradiations. He is also involved in the researches concerning the zirconium alloys as well as the Cr-coated zirconium alloys, designed to limit oxidation of Zr cladding during both nominal and accidental conditions. He is working on irradiation effects of aluminium alloys, which serve as core materials of the French Jules Horowitz experimental reactor. Joël Ribis received its PhD in 2007 from Grenoble INP focused on the creep behaviour of neutron irradiated zirconium alloys. Joël Ribis is teacher at the University of Paris-Saclay and has 60 publications in the field of nuclear materials and irradiation effects in the frame of the GEN IV Reactor, Fusion reactor, Jules Horowitz experimental Reactor and Light-Water Reactor.