NOMATEN Hybrid Seminar

Location: NOMATEN seminar room
Time: 1 PM
gotomeeting room (for online): https://meet.goto.com/NCBJmeetings/nomaten-seminar
Seminar date: January 14th, 2025

Speaker name: Dr. Laurence Lunaville

Speaker affiliation: CEA, France.

Abstract: We will show the interest of phase field methods to describe the evolution of microstructure in materials by discussing the nucleation and growth process in FeCr alloys during isochronous annealing. We have implemented a hybrid method combining Monte Carlo simulations and phase-field calculations (Cahn-Hilliard equation) to describe the microstructure in this alloy. In particular, we clearly show in this work that classical nucleation theory cannot be applied to such an alloy. This theoretical work has made it possible to explain the SAT experiments and propose mechanisms to explain the mechanical hardening observed in this material.

Bio: Dr. Luneville worked on transport equations in neutronics and radio protection. She then turned her attention to the calculation of atomic displacements to estimate the damage produced by electrons, ions and neutrons in nuclear materials. In particular, she developed the DART code, distributed by the IAEA to calculate neutron damage in solids. Finally, she has been working for over 10 years on the application of phase field methods to simulate the microstructures of materials under and out of irradiation.

Speaker name: Dr. David Simeone

Speaker affiliation: CEA, France

Abstract: We will show the difficulties encountered by phase-field methods to describe the evolution of materials under irradiation. After a brief theoretical review of phase-field methods, we present the difficulties inherent in their use under irradiation. In particular, we introduce the Swift-Hohenberg equation to describe damage induced by ion irradiation, and discuss the notion of phase diagrams under irradiation. Finally, we give a brief overview of our work on FeCr samples irradiated with ions and electrons.

Bio: Dr. Simeone has been working for over 30 years at CEA on irradiation damage in materials and its impact on microstructure and mechanical properties. After developing grazing-incidence X-ray diffraction techniques to measure irradiation-induced microstructures and co-developing the DART code with Dr. Luneville, he has since been working on phase-field methods to predict the evolution of material microstructures under and outside irradiation.