GEN IV International Forum
Expertise | Collaboration | Excellence

Webinar Invite

Education and Training Working Group

Join us on December 15, 2021, 8:30 am EST (UTC-5)

Development of an Austenitic/Martensitic Gradient Steel Connection by Additive Manufacturing

Metal additive manufacturing is already used to build parts for aeronautic or medical applications. The power generation industry is just beginning to use these new technologies to replace or repair parts. Dr Villaret's work aims to make this technology available for nuclear industry and especially for GEN IV reactors where technological innovation will find all their meaning.

Flore Villaret's PhD work focuses on an application of additive manufacturing to obtain bimetallic junctions. Such junctions between two different metals are very common in nuclear reactors, but they are often difficult to realize. The example studied is a junction between an austenitic stainless steel 316L and a martensitic steel Fe-9Cr-1Mo. Such connections are typically found in sodium fast reactors assemblies between wrapper tubes and assembly spikes. The objective is to understand the metallurgical features related to the assembly of these two steels and to evaluate the possibilities of using powder metallurgy and additive manufacturing to produce austenitic/martensitic steel transitions. With this work, the ability of additive manufacturing and powder metallurgy to overcome this challenge, by producing chemically graded parts, is demonstrated.

Beyond the replacement of already existing parts, the possibilities opened by the additive manufacturing of gradient materials are very varied. It also constitutes a new tool at the disposal of design offices to imagine new designs and applications. This study demonstrates the potential presented by these gradient materials for future innovations.

Free webcast!

December 15, 2021 8:30 am EST (UTC-5)

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Who should attend:
policymakers, managers, regulators, students, general public

Dr. Flore Villaret recently completed her PhD at the French Atomic Energy Commission (CEA) in the field of materials sciences (metallurgy). She is now a research engineer at the R&D Department of Electricité de France (EDF). She works on developing additive manufacturing of metal components for energy applications such as nuclear reactors and hydraulic power generation. She is also vice president of the French metallurgy and material society young division. She won the 2021 Pitch your Gen IV research competition with a very creative and original video presenting her PhD work in additive manufacturing metallurgy for Gen IV reactors (available at https://www.youtube.com/watch?v=v2IiEHMVyGc). She was also awarded by the French metallurgy and material society with the Bodycote best PhD thesis award.

Upcoming Webinars

27 January 2022
ESFR SMART a European Sodium Fast Reactor Concept Including the European Feedback Experience and the New Safety Commitments Following Fukushima Accident, Mr. Joel Guidez, CEA, France

24 February 2022
Artificial Intelligence in Support of NE Sector, Prof. Prinja, Nawal, JACOBS, UK

23 March 2022
Scale Effects and Thermal Hydraulics: Application to French SFR, Benjamin Jourdy, CEA, France

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