NOMATEN SEMINAR

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Title:

Possible applications of Additive Manufacturing (AM, and, principally, Laser Additive Manufacturing, LAM) and the potentialities of High Entropy Alloys in the nuclear field

Speaker:

Dr Pascal J. Aubry
Senior Expert in Laser Processing and Additive Manufacturing at the French Alternative Energies and Atomic Energy Commission (CEA)

Abstract:

The presentation proposes an overview of the possible applications of Additive Manufacturing (AM, and, principally, Laser Additive Manufacturing, LAM) and the potentialities of High Entropy Alloys in nuclear field. In the first part, the history, the context of AM, and the potentialities for nuclear applications are presented. A particular attention is given to laser cladding and powder bed fusion. A global review of ongoing projects in the field is proposed and, finally, ongoing activities at CEA/DES in additive manufacturing are described. Finally, the results obtained on 316L and other materials and the challenges for LAM related to the functional properties of LAMed materials (mechanics, corrosion, irradiation) are discussed. The second part of the presentation is aiming to present the opportunities of the recent research field on High Entropy/ Complex Composition Alloys globally and for nuclear applications. We introduce the HEA/CCAs, the different families of HEA/CCAs, and, as example, present results obtained at CEA/DES on the development of a CCA as cobalt-free hardfacing material for wear resistance.

Bio:

Dr Pascal J. Aubry is Senior Expert in Laser Processing and Additive Manufacturing at the French Alternative Energies and Atomic Energy Commission (CEA). His research activities in laser additive manufacturing, surface treatment covers material research (HEA/CCAs, Hardfacing alloys, graded materials,…), process control and modelling and simulation. After Masters in phyco-chemistry (physical metallurgy and quantum chemistry), automatic control, and computer science, he received his PhD. in Computer Science at the Robotics Laboratory, CEA France, in 1991 and entered CEA the same year as project manager. After co-managing several PhD., he received the Sc.D degree in 1996. In 1997, he joined the CLFA-GERAILP (French-German Laser Center, in cooperation with FhG ILT), where he started to develop laser systems for welding and cladding. From 1998, he became one of the first in France to introduce the Laser Additive Manufacturing (LAM) activity (laser cladding and powder bed laser melting) and participated to National and European research projects in LAM. In 2009, he joined the CEA/Nuclear Energy Division, Surface Engineering and Laser Laboratory (LISL) as Expert in Laser Processing, and associated researcher at Arts et Métiers ParisTech (ENSAM), Paris Center, where he managed the LAM and Surface Treatment ENSAM-CEA joint platform. In 2013, he became CEA Senior Expert in Laser Processing and Additive Manufacturing and participated to the development of the LAM platform at CEA/Surface Engineering and Lasers Laboratory for nuclear applications. He is regularly appointed by the French National Research Agency and the European Commission as expert regularly for the evaluation of research proposals.

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