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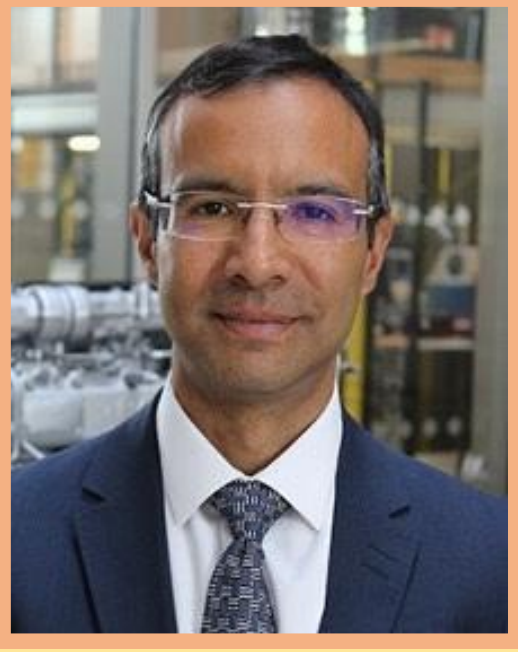
International Guest Lecture by

University of Southampton

19th April, 2024
10:30-12:00

Mode of Lecture:
Hybrid (SB301 and Zoom)



Professor Pedro Rivera
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Title: Physical and data-driven modelling approaches for the design of immiscible joints: welding, functional grading, and alloy design (Area: Metal 3D Printing)

Register for free

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Organized by: Department of Mechanical Engineering, Gandhi Institute of Technology and Management (GITAM) Deemed to be University Bengaluru Campus, Bengaluru-562163, India

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Details of the Lecture

University of Southampton

Title: Physical and data-driven modelling approaches for the design of immiscible joints: welding, functional grading, and alloy design

Abstract: A common feature shared by the processes of welding, additive manufacturing, and functionally graded materials is the provision of a localised source of energy, the use of alloys amenable to concentrated heating, rapid heating/cooling, and the adoption of dissimilar materials. Joining immiscible alloys represent a great technological and commercial opportunity; this can be achieved by adding a third surrogate alloy or element to promote the bond.

In this talk, we consider three practical cases of alloy design for immiscible systems: (1) The welding of magnesium with steel alloys mediated by a copper. (2) Functional grading of titanium and copper alloys in horizontal laser powder bed fusion. (3) Grading strategies to additively manufacture nickel-based superalloys with titanium alloys mediated by pure copper. General observations of these cases are the need to quantify energy absorption and temperature distributions, the formation and inhibition of specific intermetallic compounds, and solute redistribution. The three successful cases of alloy joining/grading are reviewed in light of deep learning and physical modelling strategies to discover a broad set or principles
and approaches for immiscible multi-material alloy design.

The presenter also takes the opportunity to introduce the world-class characterisation and modelling facilities at the University of Southampton, putting them in the context of our research in additive manufacturing.

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