



IP PARIS



LMS Seminar series 2024 – 25

Grain boundary engineering in metal additive manufacturing

Marie A. Charpagne

University of Illinois at Urbana-Champaign, U.S.A.

Date and Time: December 19, 2024 (11 – 12 am)

Venue: Amphi 104 (Pole Meca)

Abstract

Additive manufacturing (AM) is revolutionizing how we synthesize, produce, and use metallic materials. However, out of hundreds of commercially available engineering alloys, only a handful are readily printable. This arises from the extreme heating and cooling rates associated with AM, which lead to microstructures that are far from thermodynamic equilibrium and highly anisotropic. This directly impacts the mechanical properties of the printed alloys as well as their environmental resistance. In this talk, I will present strategies to break down columnar solidification structures, randomize crystals orientations, and introduce special grain boundaries by tailoring the alloy composition or processing parameters. Emphasis will be placed on the metallurgical mechanisms behind these strategies and their translatability across alloy families.

About the speaker

Marie A. Charpagne is an assistant professor in the Materials Science and Engineering Department at the University of Illinois at Urbana-Champaign. Marie graduated with a PhD in Materials Science from Mines ParisTech in 2017, focusing on thermo-mechanical processing. Before joining UIUC in Fall 2021, she was a postdoctoral researcher at the University of California in Santa Barbara, where she developed new techniques in correlative and 3D electron microscopy. Her research now leverages core concepts in physical metallurgy, rapid solidification and micro-mechanics, to design new alloys for additive manufacturing. She received her NSF CAREER award, the ACS New investigator award, the TMS Early Career Faculty Fellow award, and is the author of over 40 peer-reviewed articles.

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