PURDUE MSE SEMINAR

FRIDAY, JUNE 2ND, 2023 | 10:00AM SEMINAR | ARMS 3115

Dr. Martina Zimmermann

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"Insights into process-structure-property correlations with regard to laser-assisted manufacturing processes and high-throughput screening of metallurgical and fatigue properties"

Abstract: Laser-assisted manufacturing processes relate to classical applications such as cutting or joining but are nowadays primarily discussed as the basis for powder or wire based additive manufacturing. Since laser assisted processing is always associated with a thermal input, the original material structure is changed and hence also its mechanical behavior. In additive manufacturing process technology main focus is put on reducing porosity to a minimum, hence resulting in a static strength comparable to that of classical alloys produced by melting metallurgy. However, in the high to very high cycle fatigue regime already minor changes in microstructure and / or the existence of isolated small defects can have a significant influence on the cyclic strength. High-throughput screening results on the basis of 3-D automated serial sectioning on a micro to meso scale as well as time-efficient fatigue testing by means of high frequency fatigue systems will be presented for various laser processing technologies. As further outlook with regard to material screening methods a brief introduction of the potential to use laser cladding as experimentally-based material design tool by optionally mixing up to eight different powders and wires with different compositions will be given.

Biography: **Prof. Dr.-Ing. Since 2012, Martina Zimmermann** has held the professorship for Mechanics of Materials and Failure Analysis and Head of the Competence Field Material Characterization at the Fraunhofer Institute for Material and Beam Technology Dresden. Since 2013 she has been working as a liaison lecturer for the German National Academic Foundation. The scientist has been President (dual leadership) of the German Society for Materials Science (DGM) since January 2021 and a member of the German Academy of Science and Engineering since November 2021.

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