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Poster 3

Multi-scale in situ studies of deformation mechanism of LPBF 316L stainless steels

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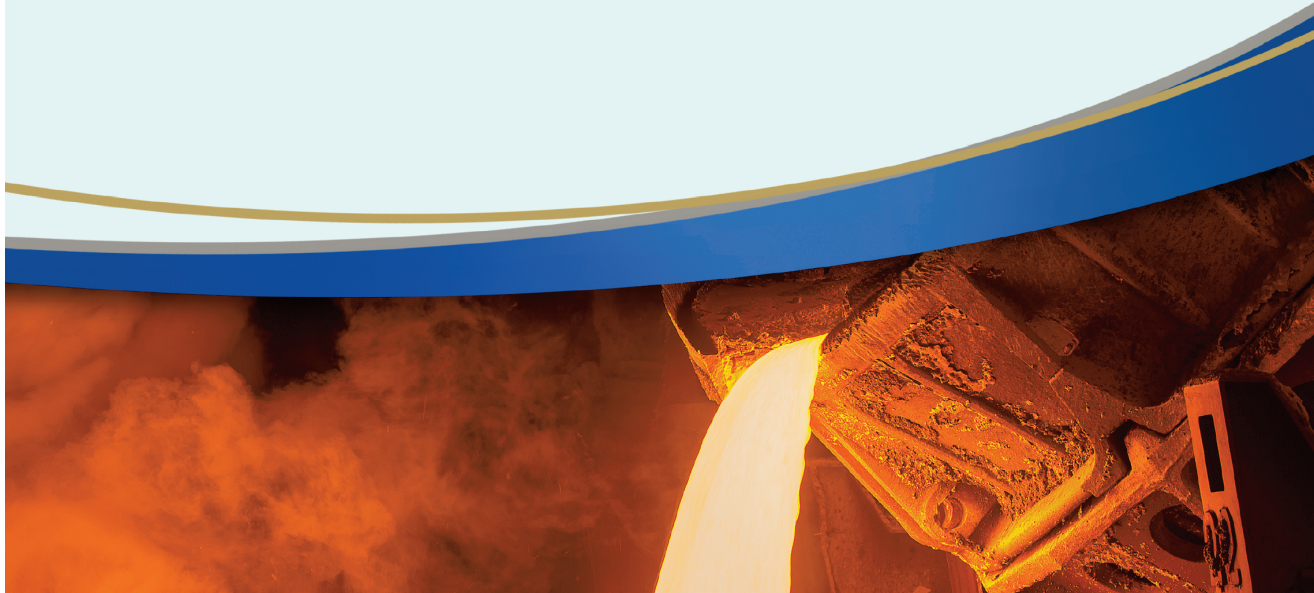
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ABSTRACT:

An understanding of deformation mechanisms of laser powder bed fusion (L-PBF) 316L stainless steels was important for further optimization of LPBF processing and the in-service applications of L-PBF 316L steel. In this study we used in situ synchrotron characterization to study the formation of corrugated surface in L-PBF 316L stainless steel during mechanical loading. In situ tomography analysis was carried out revealing the surface morphology and porosity evolution. The pores elongate and reaching the surface during loading. A corrugated surface was formed after plastic deformation. Ex situ characterizations including optical microscopy and electron microscope revealed the microstructures contributed to the mechanical performance. The findings show the further needs to optimize the mechanical performance of additive manufactured alloys through tailoring the microstructure.



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