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Microstructure Effects on the Spall Response and Failure Mechanisms of Additively Manufactured Stainless Steel 316L (SS316L) KATIE KOUBE, Georgia Institute of Technology, KAILA BERTSCH, University of Wisconsin - Madison, GREG KENNEDY, Georgia Institute of Technology, DAN THOMA, University of Wisconsin - Madison, JOSH KACHER, NARESH THADHANI, Georgia Institute of Technology — The influence of microstructure on the spall response of SS316L made via Powder Bed Fabrication (PBF) is investigated. The PBF fabrication process introduces columnar grain texture, dendritic chemical segregation, and porosity. The effect of initial defect structures and the crystallographic texture relative to shock wave propagation direction can lead to varied spall properties and failure responses. The present work is focused on determining the role of heterogeneities and process-inherent defects on the dynamic tensile and spall failure of PBF SS316L. Plate-impact experiments are performed at various impact velocities to generate varying degrees of spall failure using an 80-mm gas gun. The target fixture employees two samples; one sample is backed with PDV and VISAR probes to measure the spall properties. The other sample is soft recovered in the catch tank for post mortem microstructure characterization. EBSD and TEM are used to determine the role of PBF processing on spall initiation and propagation and are analyzed in comparison to the spall response of conventionally-manufactured steels.

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