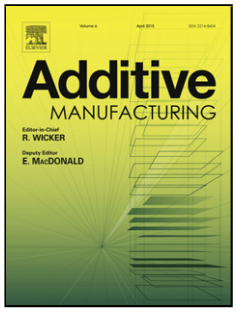

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PII: S2214-8604(18)30376-2
DOI: https://doi.org/10.1016/j.addma.2018.09.015
Reference: ADDMA 504

To appear in:

Received date: 1-6-2018
Revised date: 10-9-2018
Accepted date: 11-9-2018

Please cite this article as: Tiana Y, Chekira N, Wanga X, Nommeots-Nomma A, Gauvina R, Brochua M, Microstructure Characterization and Grain Morphology of Alloy 625 with 0.4 wt% Boron Modification Manufactured by Laser Wire Deposition, *Additive Manufacturing* (2018), https://doi.org/10.1016/j.addma.2018.09.015

Microstructure Characterization and Grain Morphology of Alloy 625 with 0.4 wt% Boron Modification Manufactured by Laser Wire Deposition

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Abstract: Laser wire deposits using Alloy 625 modified with 0.4 wt% B were manufactured on stainless steel 304 substrates. A layer boundary with a thickness of around 250 μm was formed between the layer cores during deposition. Results show that the solidification features in the layer boundary were coarser than the layer core due to the recalescence mechanism. Continuous eutectics were observed segregating the inter-dendritic regions in both the layer boundary and the layer core. The eutectics consisted of mainly Laves phase with a small amount of NbC precipitates. Solidification front velocities (SFV) were calculated from the Kurz-Giovanola-Trivedi (KGT) model. Results showed that they developed in the layer boundary and in the layer core at 0.06 m/s and 0.1 m/s respectively. Electron backscattered diffraction (EBSD) mapping revealed that small equiaxed grains nucleated in the layer boundary, while large columnar grains were prevalent in the layer core. Pole figures showed a strong oriented texture was present along the (100) plane. The columnar to equiaxed transition (CET) model developed by Hunts was considered and the results were in good agreement with the observed grain morphologies.