Title: Thermal behavior and grain growth orientation during selective laser melting of Ti-6Al-4V alloy

Authors: Jie Yin, Gangyong Peng, Changpeng Chen, Jingjing Yang, Haihong Zhu, Linda Ke, Zemin Wang, Dengzhi Wang, Mingming Ma, Guoqing Wang, Xiaoyan Zeng

PII: S0924-0136(18)30182-1
DOI: https://doi.org/10.1016/j.jmatprotec.2018.04.035
Reference: PROTEC 15735

To appear in: *Journal of Materials Processing Technology*

Received date: 19-11-2017
Revised date: 25-2-2018
Accepted date: 20-4-2018

Please cite this article as: Yin J, Peng G, Chen C, Yang J, Zhu H, Ke L, Wang Z, Wang D, Ma M, Wang G, Zeng X, Thermal behavior and grain growth orientation during selective laser melting of Ti-6Al-4V alloy, *Journal of Materials Processing Tech.* (2010), https://doi.org/10.1016/j.jmatprotec.2018.04.035

Thermal behavior and grain growth orientation during selective laser melting of Ti-6Al-4V alloy

Jie Yin[a], Gangyong Peng[a], Changpeng Chen[a], Jingjing Yang[a], Haihong Zhu[a], Linda Ke[b], Zemin Wang[a], Dengzhi Wang[a], Mingming Ma[c], Guoqing Wang[d], Xiaoyan Zeng[a,*]

[a] Wuhan National Laboratory for Optoelectronics (WNLO), Huazhong University of Science and Technology (HUST), Wuhan 430074, P. R. China

[b] Shanghai Engineering Technology Research Center of Near-Net-Shape Forming for Metallic Materials, Shanghai Spaceflight Precision Machinery Institute, Shanghai, 201600, P.R. China

[c] Process Department, CRRC Zhuzhou Locomotive Co., Ltd., Zhuzhou 412001, PR China

[d] China Academy of Launch Vehicle Technology, Beijing, 100076, P.R. China

Corresponding Author: Xiaoyan Zeng, xyzeng@hust.edu.cn, Tel: +86-27-87792457, Fax: +86-27-87541423

Abstract

Directional solidification causes a columnar grain microstructure with orientation deviating from building direction to the laser scanning direction which leads to anisotropic mechanical properties of deposited parts in selective laser melting (SLM) additive manufacturing (AM). However, compared to directed energy deposition (DED), the tilt angles between the grain growth orientation and the building direction in SLM are relatively small and hard to investigate due to the high scanning velocity and small facula during processing. This paper investigates the grain growth