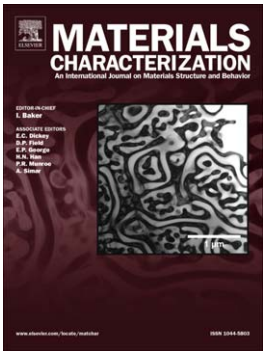


# Effect of crystallographic orientation on mechanical anisotropy of selective laser melted Ti-6Al-4V alloy

Jingjing Yang, Hanchen Yu, Zemin Wang, Xiaoyan Zeng

PII: S1044-5803(16)30755-0
DOI: doi:10.1016/j.matchar.2017.01.014
Reference: MTL 8526

To appear in: *Materials Characterization*

Received date: 28 October 2016
Revised date: 30 December 2016
Accepted date: 8 January 2017

Please cite this article as: Yang Jingjing, Yu Hanchen, Wang Zemin, Zeng Xiaoyan, Effect of crystallographic orientation on mechanical anisotropy of selective laser melted Ti-6Al-4V alloy, *Materials Characterization* (2017), doi:10.1016/j.matchar.2017.01.014

# Effect of crystallographic orientation on mechanical anisotropy of selective laser melted Ti-6Al-4V alloy

Jingjing Yang, Hanchen Yu, Zemin Wang *, Xiaoyan Zeng

*Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan 430074, PR China*

**Abstract**: The crystallographic texture of Ti-6Al-4V produced by selective laser melting (SLM) under various laser energy densities was characterized by electron backscatter diffraction technique to explore its effect on the anisotropy in tensile properties. Results show that crystallographic orientation depending on laser energy density acts a significant role in determining the mechanical anisotropy of SLMed Ti-6Al-4V samples. The microstructure of the SLMed Ti-6Al-4V samples consists of fully martensites. As for the martensites, the fraction of basal orientations decreases, while the content of prismatic orientations increases with laser energy density increasing from 101 to 269 J/mm$^3$. And the order of the dominated crystallographic orientation of martensites with the laser energy density is $(12\bar{3}0)[2\bar{1}\bar{1}3] \rightarrow (11\bar{2}4)[\bar{1}\bar{3}41] \rightarrow (11\bar{2}0)[1\bar{1}01] \rightarrow (11\bar{2}0)[2\bar{2}03]$. There is anisotropy in tensile properties between horizontally and vertically built samples, which is more obvious with laser energy density. The formation of such anisotropy is ascribed to the higher Schmid factor values of the grains in the vertically built tensile samples than those in horizontally built ones.

**Keywords**: Selective laser melting; Ti-6Al-4V; Texture; Tensile property; Anisotropy