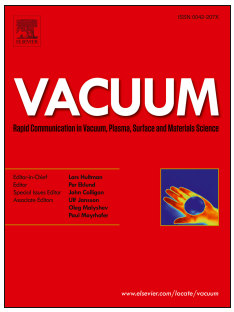
Accepted Manuscript



Effect of solution treatment on microstructure and tensile properties of a U720LI Ni-based superalloy

Zhipeng Wan, Lianxi Hu, Yu Sun, Tao Wang, Zhao Li, Yong Zhang

PII: S0042-207X(18)31000-5

DOI: 10.1016/j.vacuum.2018.07.041

Reference: VAC 8132

To appear in: *Vacuum*

Received Date: 12 June 2018

Revised Date: 25 July 2018

Accepted Date: 27 July 2018

Please cite this article as: Wan Z, Hu L, Sun Y, Wang T, Li Z, Zhang Y, Effect of solution treatment on microstructure and tensile properties of a U720LI Ni-based superalloy, *Vacuum* (2018), doi: 10.1016/j.vacuum.2018.07.041.

Effect of solution treatment on microstructure and tensile properties of a U720LI Ni-based superalloy

Zhipeng Wan[1, 2, 3], Lianxi Hu[1, 2*], Yu Sun[1, 2**], Tao Wang[3], Zhao Li[3], Yong Zhang[3]

1 *National Key Laboratory for Precision Hot Processing of Metals, Harbin Institute of Technology, Harbin 150001, P.R. China*

2 *School of Materials Science and Engineering, Harbin Institute of Technology, Harbin 150001, China*

3 *Science and Technology on Advanced High Temperature Structural Materials Laboratory, AEEC Beijing Institute of Aeronautical Materials, Beijing 100095, P.R. China*

Abstract:

The effect of solution treatment in a range from 1130°C to 1150°C on the microstructure and tensile properties of an as-forged U720LI superalloy was investigated under various temperatures between room temperature and 750°C of tensile tests. It was revealed that a high solution treatment temperature leads to coarsening of grains and secondary gamma prime precipitates, and thus decreases of room temperature and 400°C strength and ductility. A combination of ductile and brittle mode characterized by dimples and quasi-cleavage facets feature was observed for 1130°C and 1140°C solution treatment. The initiation and coalescence of microvoids at the interface of matrix and precipitates as well as the planar-slip process promoted the formation of quasi-cleavage fracture. In addition, a mixed intergranular and transgranular quasi-cleavage fracture with some dimples features for 1150°C solution treatment was also identified under 750°C tensile test.

Keywords: U720LI superalloy; Heat treatment; Tensile test; Fracture mechanism;

* Corresponding author.

** Corresponding author.

Tel.: +86 451 86418613. Fax: +86 451 86418613.

E-mail addresses: lianxihu_hit@163.com (L.X. Hu), yusun@hit.edu.cn (Y. Sun).