

## PRIMARY RESEARCH ON VPS-W/CU MOCK-UPS FOR EAST TUNGSTEN DIVERTOR PROJECT

Yangyang Zhang<sup>1</sup>, Qiang Li<sup>1</sup>, Pan Qi<sup>1</sup>, Feng Liu<sup>1</sup>, Haishan Zhou<sup>1</sup>, Xiaojun Kuang<sup>2</sup>,

Chunming Deng<sup>2</sup>, Changguang Deng<sup>2</sup>, G.-N. Luo<sup>1</sup>

<sup>1</sup>*Institute of Plasma Physics, Chinese Academy of Sciences*

<sup>2</sup>*Guangzhou Research Institute of Nonferrous Metals*

*Corresponding author: gnluo@ipp.ac.cn*

As a promising candidate of plasma facing material (PFM), tungsten has been used in tokamaks such as JET[1], ASDEX Update [2], and will be used in ITER in the divertor region at the initial phase [3, 4]. In 3-5 years, the SiC-C tiles currently being used in EAST device will be replaced into tungsten coated CuCrZr heat sink [4]. The EAST tungsten divertor project has been divided into several phases. Firstly, small scale mock-ups will be manufactured and tested to make sure that it will be qualified for the requirements of EAST. And then, large scale mock-ups and prototype components will be developed. Small scale W/Cu mock-ups are now being developed with the method of vacuum plasma spraying (VPS) in collaboration with Guangzhou Research Institute of Nonferrous Metals (GZRINM).

This paper presents the latest progress of the research on small scale VPS-W/Cu mock-ups. Small scale VPS-W/Cu mock-ups with castellation structures were manufactured by the means of VPS. Several different kinds of interlayers were employed to reduce thermal stress in the interface between W coatings and CuCrZr base. Physical, thermal and mechanical properties of the VPS tungsten layers were tested to examine the quality of the tungsten coatings. High heat flux (HHF) tests were carried out to examine the bonding quality between tungsten coating and heat sink. The effects of castellation structures and interlayers on the thermal fatigue resistance of the mock-ups were discussed. Simulations of mock-ups with castellation structures and different interlayers under HHF condition were performed by means of ANSYS code. The experiment and simulation results were compared and conclusions were presented in the end.

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[3] Bolt, H., V. Barabash, et al. Journal of Nuclear Materials 307, 2002, 43-52.

[4] G.-N. Luo, X.D. Zhang, et al., Physica Scripta T128, 2007, 1-5