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Thermal radiative characteristics of nanostructured tungsten at high-temperature

S. Takamura^{a,d}, Y. Uesugi^b, Y. Kikuchi^c, M. Nagata^c, K. Yamada^d, T. Kobayashi^d, S. Maenaka^d, K. Fujita^d, H. Kurishita^e

^aResearch Institute for Industrial Technology, Aichi Institute of Technology, Yakusa-cho, Toyota 470-0392, Japan

^bFaculty of Electrical and Computer Engineering, Institute of Science and Engineering, Kanazawa University, Kanazawa 920-1192, Japan

^cGraduate School of Engineering, University of Hyogo, 2167, Shosha, Himeji 671-2280, Japan

^dYUMEX Inc., Itota 400, Yumesaki-cho Himeji 671-2114, Japan

^eInteraction Research Center for Nuclear Materials Science, Tohoku University, 2145-2, Narita-cho, Oarai-machi, Higashiibaraki-gun, Ibaraki 311-1313, Japan

E-mail: takamura@aitech.ac.jp

Abstract

Fiber-form nanostructures grown on tungsten (W) surfaces with helium (He) plasma irradiation exhibit an excellent thermal radiative property at low sample temperatures up to 1200 °C. To maintain this radiative property at higher temperatures, the recovery to undefected surface and annealing effect of nanostructured W surfaces need to be investigated while focusing on the dopant effect. TFGR-W-1.1%TiC/H (toughing, fine-grained recrystallized tungsten with TiC dispersoids) was experimentally found to have the best characteristics among the tested doped W samples. However, it was noted and discussed that a further improvement at higher temperatures needs an additional surface treatment. Possibilities of maintaining complicated structures with nano-scale lengths are discussed in terms of dopant pinning effect and self-diffusion on tungsten surface.

Keyword: nanostructure, tungsten, black-body radiation, dopant effect

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*Corresponding author.

E-mail address: takamura@aitech.ac.jp (S. Takamura)

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