# Hydrogen Isotopes and Helium Interactions with EAST Plasma-facing Materials

G.-N.Luo[a,*], C.P.C.Wong[b], K.Okuno[c], K.Umstadter[d], M.Matsuyama[e], D.Rudakov[d], W.Wampler[f], and W.M.Shu[g]

[a]*Institute of Plasma Physics, Chinese Academy of Sciences, P.O.Box 1126, Hefei, Anhui 230031, China*

[b]*General Atomics, San Diego, CA 92186-5608, USA*

[c]*Radiochemistry Research Laboratory, Shizuoka University, 836 Oya, Shizuoka 422-8529, Japan*

[d]*Center for Energy Research, University of California, San Diego, CA 92093-0417, USA*

[e]*Hydrogen Isotope Research Center, University of Toyama, Gofuku 3190, Toyama 930-8555, Japan*

[f]*Radiation Solid Interactions Department, Sandia National Laboratory, Albuquerque, NM 87185, USA*

[g]*ITER Organization, CS 90 046, 13067 St Paul Lez Durance Cedex, France*

The EAST tokamak is a full superconducting machine and long pulse plasmas have been achieved (10s@0.6MA & 63s@0.25MA during campaign 2008/2009) after 3 years' operation. This unique advantage makes it an ideal device to study the plasma-wall interactions (PWI) and to test the plasma-facing materials and components (PFMC) relevant to high performance steady state plasmas. The recently launched EAST W/Cu-PFC project aims at upgrading the present bolting doped graphite first wall into actively-cooled tungsten-copper PFC step by step [1]. The project needs further and better understanding on the PWI behavior of the graphite tiles and the W materials with exposure to hydrogen isotopes and/or helium plasmas.

The graphite tiles are made of a kind of multi-element doped graphite GBST1308 (1%$B_4C$, 2.5%Si, 7.5%Ti) with thick SiC gradient coatings (SiC/C), and the W material is thick coatings prepared directly on CuCrZr heat sink by means of vacuum plasma spraying (VPS-W) [2]. The SiC/C and VPS-W samples, together with other kinds of samples for comparison, were exposed to tritium gas and then examined by means of β-ray-induced X-ray spectrometry (BIXS) [3]. To study the behavior of blistering and retention, the W samples were irradiated employing linear plasma generators at JAEA and UCSD (PISCES-A), with fluxes $\geq 1\times10^{22}$D/m$^2$/s and energies <100eV/D [4]. Some of the D irradiated samples were further exposed to DIII-D He plasmas using the DiMES system. The surface compositions and the hydrogen isotope behavior of the boronized VPS-W samples prepared in HT-7 during the ICRF carborane ($C_2B_{10}H_{12}$) boronization wall-conditioning were analyzed using SEM, AFM, XPS, and TDS [5]. The results of the tritium uptake in the SiC/C and the W samples, the blistering and retention, and the effect of boronization will be summarized in the presentation. And also presented is the latest progress on the PWI experimental platform and future research plan on EAST.

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[2] G.-N. Luo, et al., Coating materials for fusion application in China. ***ICFRM-14***, Sapporo, Japan, Sept. 6-11, 2009.

[3] Jing Wu, et al., BIXS Measurements of Tritium Uptake in C and W Materials for EAST. ***ICFRM-14***.

[4] G.-N. Luo, et al., Behavior of tungsten with exposure to deuterium plasmas, ***NIMB***, 267 (2009) 3041–3045.

[5] Zhongshi Yang, et al., Surface Analysis of VPS-W ICRF-Boronized in HT-7. ***ICFRM-14***.