

Title: Deuterium and helium retention in tungsten-based materials exposed to plasma

O. V. Ogorodnikova
National Research Nuclear University MEPHI (Moscow Engineering Physics Institute), Kashirskoe sh. 31, 115409 Moscow, Russia

Tungsten and dense nano-structured tungsten (W) coatings are used as plasma-facing materials in current tokamaks and [A1]suggested to be used also for the future fusion devices, ITER and DEMO. In the fusion reactor, W will be exposed to energetic particles of hydrogen isotopes and helium (He), high heat flux, and neutrons. In this regard, a study of accumulation of deuterium (D) and He in W under normal operation conditions and transit events is necessary for assessment of safety of fusion reactor due to the radioactivity of tritium and material performance and for the plasma fuel balance. Therefore, W samples were exposed to low-temperature plasma to simulate normal operation regimes and pulsed heat loads using D plasma in quasi-stationary high-current plasma gun QSPA-T to simulate transit events. We found that D and He concentrations increase with decreasing the grain size. The D retention was the highest for samples irradiated by plasma gun above the melting threshold. The D retention after 10 pulses of plasma gun exposure was much higher than that after stationary low-energy plasma exposure at sample temperature of either 600 or 700 K indicating the dominate influence of ELM's-like events on the D retention compared to normal operation regime. The D retention in W samples with the presence of He-induced W 'fuzz' was smaller than without that. The results obtained give possibility to assess the particle retention in divertor areas subjected to high thermal loads at different operation regimes.

Biography

She has completed her PhD from Moscow Engineering Physics Institute (MEPhI) at the age of 29 years and then she worked at the Italian Agency for Energy Environment and New Technologies (ENEA), CEA (Commissariat a l'Energie Atomique) in France (Saclay), the Kurchatov institute (Moscow), the Max-Planck-Institut für Plasmaphysik (IPP, Garching), Forschungszentrum Juelich (FZJ) and CEA in France (Cadarache). Last four years, she works at MEPhI. She has published more than 80 papers in reputed journals.

Presenting author details

Full name: Olga Vaycheslavovna Ogorodnikova
Contact number:+79163277250
Twitter account:
Linked In account:
Session name/ number:
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