Contribution ID: **697** Type: **not specified**

P2.125 Investigation of deuterium retention in tungsten exposed to high-flux steady-state helicon plasmas

Tuesday, 18 September 2018 11:00 (2 hours)

High Magnetic field Helicon experiment (HMHX) is a linear helicon wave plasma (HWP) source with high axial magnetic field (B0<6300 G), which address fuel retention in first wall materials. High flux Ar/D2 plasmas are produced using an inner half helical antenna with RF power source operating at a frequency of 13.56 MHz at power levels up to 5 kW. Langmuir probe, OES and Hiden EQP (Electrostatic QuadruPole Plasma Mass Spectrometer) analyzer are used for the measurement of EEPFs, IEDF of deuterium ion D+ and other plasma parameters (including electron density ne, electron temperature Te, plasma potential Vp). The ion flux and energy of D+ are controlled by tuning the flow-rate ratio of D2 and Ar. Tungsten samples are exposed to 30 mins plasma pulses in an axial magnetic field of 1300 G with different substrate temperature and negative bias voltage. Particle balance analysis is used to estimate the real time evolution of the deuterium in-vessel retention. Deuterium retention in tungsten samples are investigated later using thermal desorption spectroscopy. Results shows that deuterium retention in HWP mode is much higher than that in ICP (Inductively Coupled Plasma) mode due to higher ion flux and energy. Also, a strong reduction of retention with higher surface temperature and lower negative bias is found and an approximate model is used to simulate diffusion and trapping of hydrogen in tungsten.

Presenter: HUANG, Tianyuan (College of Physics Optoelectronics and Energy Collaborative Innovation Center of Suzhou Nano Science and Technology Soochow University)

Session Classification: P2