

Edge plasma conditioning comparison between He/H discharges on W7-X

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Edge plasma conditioning is one of the key issues for achieving high performance plasmas in fusion devices. The processes occurring on the wall, properties of plasma edge and the main plasmas has a strong nonlinear connection. The interaction of the edge plasma with the plasma facing components (PFCs) is determined by plasma density, temperature, flows, power fluxes and neutral fluxes. Physical and chemical sputtering is the main process in the plasma-wall interaction [1]. The gross erosion rates owing to physical and chemical sputtering processes have been investigated extensively by optical emission spectroscopy on TEXTOR [2], ASDEX-Upgrade [3], JET [4], and DIII-D [5].

Wendelstein 7-X (W7-X) is a large superconducting stellarator, which has an island divertor system for particle and energy exhaust. In W7-X operation phase 1.2a (OP1.2a), ten test divertor units (TDU) made of graphite without water cooling have been installed. The main heating method is electron cyclotron resonance heating (ECRH) with maximum input power 8.5MW. In order to study the divertor plasma conditioning, one Czerny-Turner spectrometer with high spectral resolution has been installed, which has 25 fiber input on I port and K port, respectively. Here, we report on the initial studies of edge plasma conditioning comparison between He/H discharges on divertor region. The fraction of chemical and physical sputtering at divertor plates as well as the dissociation chain of released hydrocarbons under typical edge plasma conditions has been studied. Comparison of carbon source and transport characteristics in divertor plasma in He/H discharges has been reported.

References

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