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P4.057 Plasma cleaning of ITER diagnostic mirrors with coaxial λ/4 water-cooling line

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First mirrors (FMs) of optical diagnostics in ITER will operate in a harsh environmental conditions. Deposition of plasma-facing materials on the mirror surface will cause a degradation of the nominal diagnostic performance. During ITER lifetime the mirror optical characteristics are intended to be periodically recovered by an appropriate cleaning technique. Cleaning system based on the RF capacitively-coupled discharge (RFCCD) with a mirror used as a RF-electrode is currently considered as the most promising technique. FMs in ITER are subject to high heat loads due to neutron flux and the intense radiation. To prevent overheating, most FMs are water-cooled. Tests of the mirror cleaning system concept with water-cooling line designed as RF notch filter were performed. The notch filter performance was verified for D2 and noble discharges at the pressure of few Pa. The λ/4 shorted coaxial mineral cable attached to the RF-electrode was used as an electrical analogue of the cooling line. The IEDF and ion flux measured at the powered electrode in the schemes with and without stop band filter were compared. The concept of cooling line integrated into notch filter was analyzed by assessment of Be/BeO/W sputtering rates for different operating parameters e.g. pressure, gas type, RF power etc. The sputtering efficiency and homogeneity were studied at the frequency of 81 MHz for two typical cleaning scenarios: with and without magnetic field (up to 0.7 T) in the experiments on Mo mirror cleaning. The scaled laboratory mock-up of the edge CXRS cooled FM with water line designed as λ/4 stop band filter was used for the test cleaning from proxy metal coatings. Acknowledgement: This report supported in part by ITER Organization (contract –IO/17/CT/4300001626) was prepared as an account of work for the IO. The views and opinions expressed herein do not necessarily reflect those of the ITER Organization.

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