Virtual IED sensor at an rf-biased electrode in low-pressure plasma[1] MARIA BOGDANOVA, Faculty of Physics, Moscow State University, MSU, Moscow Russia, DMITRY LOPAEV, Skobeltsyn Institute of Nuclear Physics, Moscow State University, SINP MSU, Moscow Russia, SERGEY ZYRYANOV, Faculty of Physics, Moscow State University, MSU, Moscow Russia, ALEXANDER RAKHIMOV, Skobeltsyn Institute of Nuclear Physics, Moscow State University, SINP MSU, Moscow Russia — The majority of present-day technologies resort to ion-assisted processes in rf low-pressure plasma. In order to control the process precisely, the energy distribution of ions (IED) bombarding the sample placed on the rf-biased electrode should be tracked. In this work the Virtual IED sensor concept is considered. The idea is to obtain the IED virtually from the plasma sheath model including a set of externally measurable discharge parameters. The applicability of the Virtual IED sensor concept was studied for dual-frequency asymmetric ICP and CCP discharges. The IED measurements were carried out in Ar and H_2 plasmas in a wide range of conditions. The calculated IEDs were compared to those measured by the Retarded Field Energy Analyzer. To calibrate the Virtual IED sensor, the ion flux was measured by the pulsed self-bias method and then compared to plasma density measurements by Langmuir and hairpin probes. It is shown that if there is a reliable calibration procedure, the Virtual IED sensor can be successfully realized on the basis of analytical and semianalytical plasma sheath models including measurable discharge parameters.

Maria Bogdanova
Faculty of Physics, Moscow State University, MSU, Moscow Russia

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