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Laser-induced-fluorescence in the sheath of a thermionic Ar/O₂ Plasma. SEBASTIAN ENGE, FARA AZIZ, ALF KÖHN, EBERHARD HOLZHAUER, ULRICH STROTH, Institut für Plasmaforschung, Universität Stuttgart, 70569 Stuttgart, Germany — In most technical plasma processes, the ion impinging energy has an important influence on the process quality. The ions gain their energy from the potential drop in the sheath region. To modify the ion energy, the substrate can be biased with a radio-frequency voltage. Furthermore, in plasma etching processes negative ions influence the sheath potential and thus the ion energy. Therefore information on the ion velocity distribution function (ivdf) in the sheath region is needed to improve the quality of plasma processing. For the investigation of the ivdf in the sheath region, a laser-induced-fluorescence diagnostic is installed on a double-plasma device. The diode laser used has an optical output of 25 mW at 668.6 nm and a mode-hop-free tuning range of 20 GHz. It is modulated with an acoustic optical modulator. The fluorescence light is collected with a PMT. For data acquisition, a 24-bit 100 kS/s PC card is used. In the first step the sheath potential has been studied in DC discharges for different fractions of negative ions in the Argon plasma. The experimental setup and first results on the sheath profile will be presented.

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