Plasma Consult

13.56 MHz Inductively Coupled Plasma Source ICP-P 200

Ion Energy Distribution Functions

The Argon and Nitrogen ion energy distribution functions (IEDF) were measured by a retarding field analyzer (RFA) which was flanged on the grounded wall of the plasma chamber. It can be seen from Fig. 1 and 2 that the maximum ion energy is below 20 eV for all pressures and powers investigated.

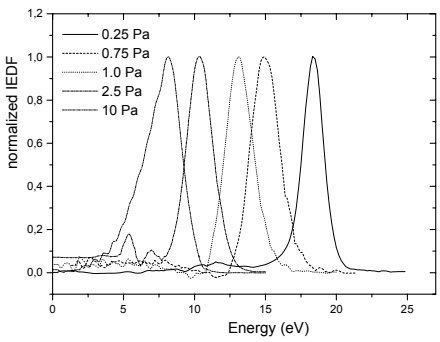
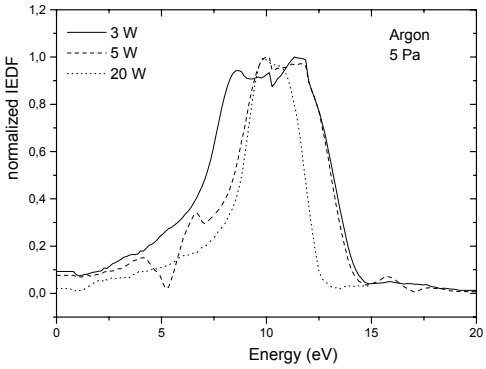


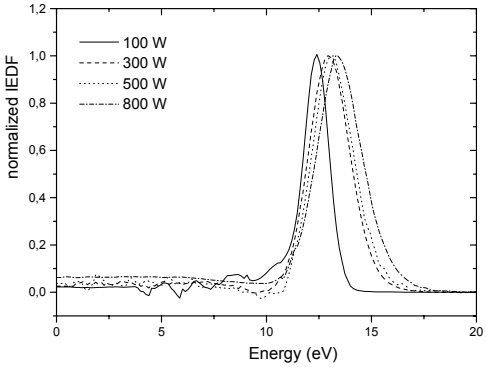
Fig. 1 Ion energy distribution in a nitrogen plasma as a function of pressure
The mean ion energy is increases with decreasing pressure and is determined essentially by the dc plasma potential. (Rf power 500 W, 10 sccm nitrogen gas flow).

Typical Data

These data were taken for typical vacuum chamber geometry at minimum reflected power. Depending on the installation and set-up used the data may vary.



(2a)



(2b)

Fig. 2 Ion energy distribution in an argon plasma as a function of rf power
At low rf power a broader distribution due to the capacitive coupling is observed while above 20 W the discharge operates in the inductive mode even without a Faraday shield (Fig. 2a: 5 Pa, Fig. 2b: 1 Pa Ar; gas flow 10 sccm).

TECHNICAL NOTE

ICP-P 200

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Plasma density

The Argon and Nitrogen ion density, measured by a double Langmuir probe system also manufactured by JE PlasmaConsult GmbH, downstream the quartz window is shown in Figs. 3 to 7.

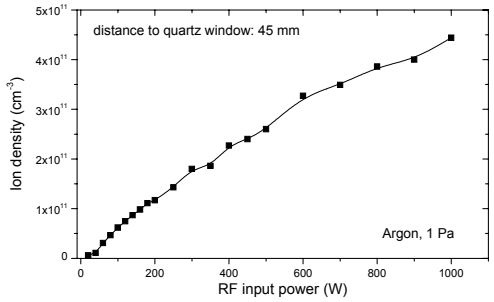

Fig. 3 **Plasma density in an Ar-plasma as a function of rf-power**
The density can be varied over 2 orders of magnitude and exceeds 3 x 10^{11} cm^{-3} at rf-powers > 400 W (position 45 mm downstream, 1 Pa Ar, gas flow 10 sccm).

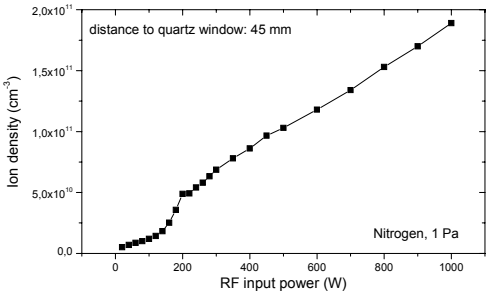

Fig. 4 **Plasma density in an N_2-plasma as a function of rf-power**
The density can be varied over 2 orders of magnitude and exceeds 1 x 10^{11} cm^{-3} at rf-powers > 400 W (position 45 mm downstream, 1 Pa N_2, gas flow 10 sccm).

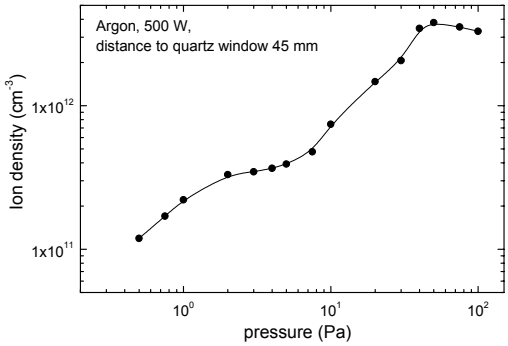

Fig. 5 **Plasma density in an Ar-plasma as a function of pressure**
The ***ICP-P 200*** can be operated over 2 orders of magnitude of pressure. The plasma density exceeds 2 x 10^{11} cm^{-3} for pressures between 1 and 100 Pa (position 45 mm downstream, P_{rf} = 500 W, gas flow 10 sccm).

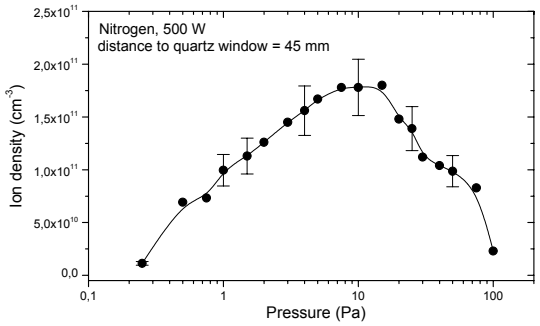

Fig. 6 **Plasma density in an N_2-plasma as a function of pressure**
The ***ICP-P 200*** can be operated over 2 orders of magnitude of pressure. The plasma density exceeds 1 x 10^{11} cm^{-3} for pressures between 1 and 40 Pa (position 45 mm downstream, P_{rf} = 500 W, gas flow 10 sccm).

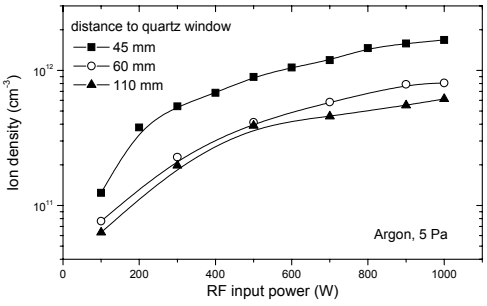

Fig. 7 **Plasma density in an Ar-plasma as a function of rf-power**
for different distances to the quartz window (5 Pa Ar, gas flow 10 sccm)

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