

## 13.56 MHz Hollow Cathode Plasma Source HCD-L 300

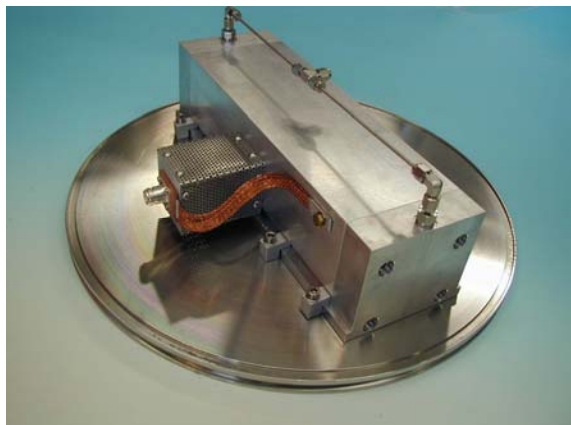


Fig.: HCD-L 300

### Multi-jet hollow cathode discharge for remote polymer deposition

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The work described below was performed using a PlasmaConsult HCD-L 300 hollow cathode plasma source.

D. Korzec<sup>\*</sup>, J. Engemann, M. Mildner, K.-P. Ningel, O. Borgmeier and D. Theirich  
*Multi-jet hollow cathode discharge for remote polymer deposition*  
Microstructure Research Center -fnt, University of Wuppertal, Germany

#### Abstract

A new method for large area polymer deposition, based on a r.f. multi-jet plasma source is presented. Plasma jets with conical shape are extracted from a common r.f. hollow cathode discharge (HCD). The performance of the plasma sources with a single row of 14 nozzles and with a two-row matrix of 27 nozzles was characterized. At low pressure (<1 mbar) only a periodic series of plasma jets are observed. At higher pressure (>10 mbar) intense plasma jets are extracted from all

nozzles. Their length is a function of r.f. power and pressure, and ranges between few millimeters and 10 cm. The ignition power increases from 125 to 245 W with pressure increasing from 10 to 45 mbar. Jets can be sustained down to 3 W for 10 mbar and down to 7 W for 45 mbar. This work shows the ability of the multi-jet plasma source for large area polymer film deposition on substrates such as metal and plastic foils, membranes, textile, paper or web. To improve the homogeneity of the film and to avoid the frequent removal of polymeric residue from the HCD walls, a remote process was developed. A carrier gas (argon) is introduced into the primary HCD. The monomer ( $C_4F_8$ ) is distributed homogeneously outside the plasma source at a distance of 35 mm from the anode surface and 12 mm from the coated substrate. Typical deposition rate is 15 nm/min.

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For further information please contact:

Plasma Consult

JE PlasmaConsult GmbH  
Rainer-Gruenter-Str. 21, Geb. FN  
42119 Wuppertal  
Germany

Tel. ++49-202-28397-0  
Fax ++49-202-28397-123  
contact@plasmaconsult.de  
www.plasmaconsult.com