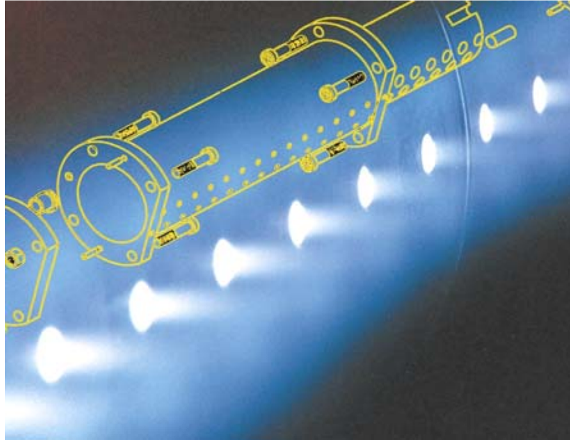
Plasma Consult

TECHNICAL NOTE

HCD-L 300

13.56 MHz Hollow Cathode Plasma Source HCD-L 300



Contamination by the HCD-L 300

The Hollow Cathode Plasma Source HCD-L 300 developed by JE PlasmaConsult GmbH has potential industrial applications in the fields such as plasma CVD, plasma polymerisation, plasma etching. For industrial applications it is important to know the degree of contamination caused by the plasma source. Because the body of the HCD-L 300 is made of aluminum, the contamination of aluminum sputtered by the plasma jet has to be considered.
Results are shown of the analysis of 6” silicon wafer surfaces exposed to argon and oxygen plasma generated by the HCD-L 300.

Experimental conditions

Tab. 1: experimental conditions

Plasma source	HCD-L 300
Substrate	6” silicon wafer
RF power	300 W
Bias voltage	0 V
Discharge gas	Argon, Oxygen
Pressure	13.3 Pa
Substrate distance	50 mm
Exposure time	30 minutes

Analysis method

Metal impurities on silicon wafers are collected and concentrated by a pre-treatment step and then analysed by graphite furnace atomic absorption spectroscopy. The detection limit of aluminum is 0.1 ng/wafer, 1 x 10^{10} atoms/cm^2.

Results

Tab. 2: aluminium on silicon surfaces

Exposed to argon plasma	1600 ng/ wafer	2.0 x 10^{14} atoms/cm^2
Exposed to oxygen plasma	1900 ng/ wafer	2.4 x 10^{14} atoms/cm^2
Non-treatment	< 0.1 ng/ wafer	< 1 x 10^{10} atoms/cm^2

Aluminum is detected on both silicon surfaces exposed to argon and oxygen plasma. The amount of aluminum is about 0.3 angstrom in thickness, and of the order of 10^{14} atoms/cm^2, which is about the same as the implantation dose in the semiconductor field. It seems that this amount of aluminum can be permitted most applications except for the semiconductor field. However, it depends on the evaluation by each customer.

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