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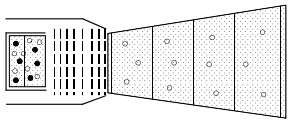

***Material Technology by New Plasma- and Ion Beam Techniques***

# Heaters for Ion Beam- and Plasma Processing

## 1 Application

Heaters for ion beam- and plasma processing operate at the temperature range up to 500 C. Mostly they are halogen lamp based and used for:

- Substrate heater for ion beam- and plasma processing generated from plasma- and ion sources operating at high vacuum,
- Substrate heater for plasma processing with plasma reactors or plasma sources operating in the mbar- range,
- Heaters for heating of high temperature ion beam- and plasma sources.

Together with our Plasma- and Ion Sources [1,2,4,5] and inline substrate holders [4] cost effective systems for ion beam and plasma processing in existing or new vacuum equipment can be installed used for research and development and small scale industrial production.

## 2 Overview heaters

Tab.1 gives an overview about the heaters.

| | **Substrate heater for plasma processing** | **Substrate heater for ion beam processing** | **Ion beam- and plasma source heater** |
|---|---|---|---|
| **Heater elements** | halogen lamps | halogen lamps | halogen lamps |
| **Pressure range** | $10^{-8}$ to 1000 mbar | < $10^{-2}$ mbar | < $10^{-2}$ mbar |
| **Voltage** | 24 V | 220 V | 220 V |
| **Heater power** | 0.1 to 3 kW | 0.1 to 3 kW | 0.1 to 3 kW |
| **Thermoelement** | type K | type K | type K |
| **Control interface** | analogue interface | analogue interface | analogue interface |

Tab.1: Overview substrate heaters

The heaters consists of the halogen heater with dimensions dependent on the substrates and on the process equipment and of a electrical power unit with max. 3 kW heater power. The heaters used at high vacuum use halogen lamps for 220 V, the plasma process heater use 24 V halogen lamps to avoid plasma break downs and arcing. By using conventional halogen lamps cost effective solutions can be build.

## 3 Application Examples

Two application examples are shown:

a) **Heaters for heating of ion- or plasma sources for temperatures up to 400 C for generating of plasmas or ion beams of liqueous precursors or low melting point metals or isolators (fig.1).**

b) **Substrate heaters in linear substrate transport mechanisms together with linear plasma or ion sources (fig.2).**

Like shown at fig.1 circular or linear ion- or plasma sources can be heated up to 400 C by a surrounding set of halogen lamps. The temperature is measured inside the source near the discharge plasma.

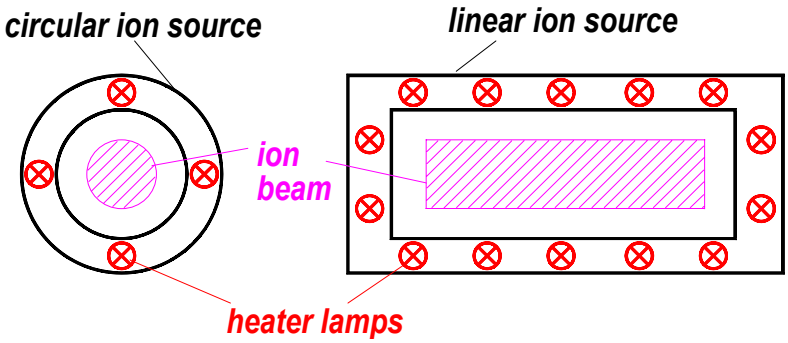


**Fig.1:** Principle of ion source heaters

Fig.2 shows the principle of heating substrates at a linear inline substrate holder used for ion beam or plasma processing with linear sources. The substrates moved by a linear transport mechanism first come to the heater and are heated to the process temperature before the enter the process zone of the plasma- or ion source.

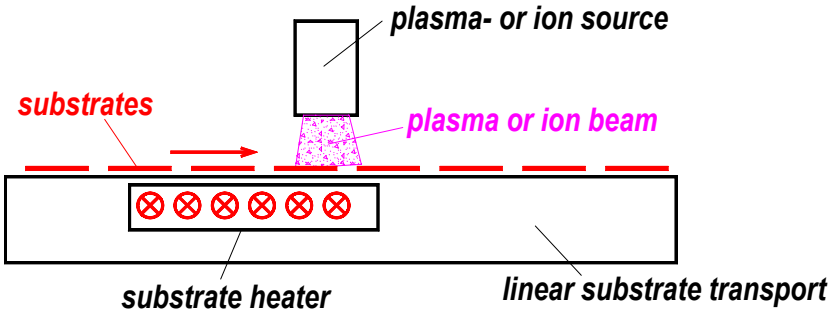


**Fig.2:** Principle of substrate heaters

## 4 References


[1] "Alternating Cold Cathode Ion source JENION ACC-40 IS", product information , JENION 2003.

[2] "Broad Beam Ion Implantation with linear ACC ion sources JENION ACC-30x150 IMP, ACC-40 x300 IMP and ACC-40x600 IMP " product information, JENION 2003.

[3] "Linear substrate holders for plasma- and ion beam processing", product information JENION 2003.

[4] "Linear ACC-ion sources ACC-30x150 IS, ACC-40 x 300 IS and ACC-40 x 600 IS", product information , JENION 2003.

[5] "Alternating Cold Cathode Plasma Sources ", product information, JENION 2003.