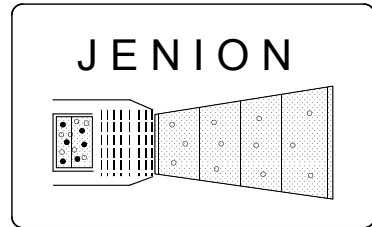


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Material Technology by New Plasma- and Ion Beam Techniques

JENION - Dr. Hermann Schlemm
Ion Beam- and Surface-Technique

1. Company profile

JENION - Dr. Hermann Schlemm - Ion Beam- and Surface-Technique was founded in 1994. It is a small company for special problems of Ion Beam- and Thin Film Technology. These are:

- **Specialized Broad Ion Beam Systems for Research & Development and industrial applications like mass separated Ion Sources, Broad Beam Ion Implanters and reactive gas ion sources**
- **Cold Cathode Plasma and Ion Sources working by the ACC-principle,**
- **Plasma and Ion Beam Measuring Technique,**
- **Research & Development in the field of Ion Beam- and Plasma-Technology,**
- **Research & Development in the field of Thin Film Technology.**

2. Products overview

Fig.1 and tab.1 give an overview about the ion beam parameters of our systems. Some more customer specified solutions are possible.

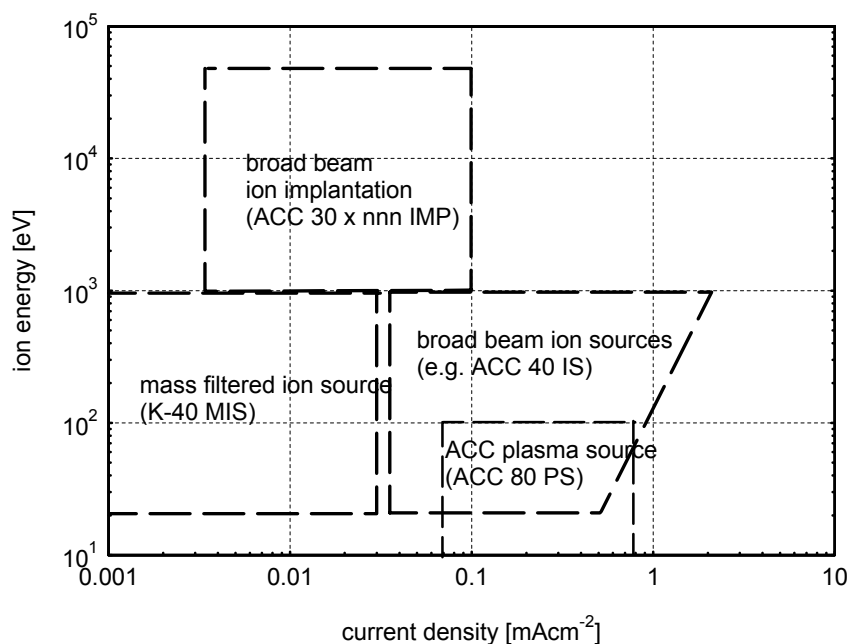
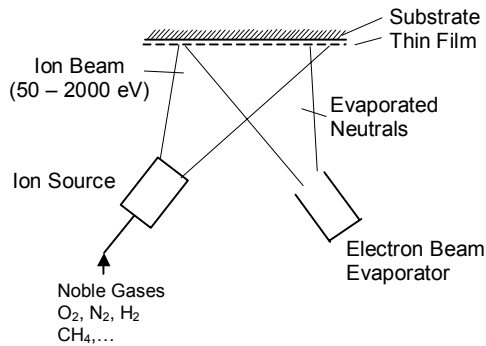


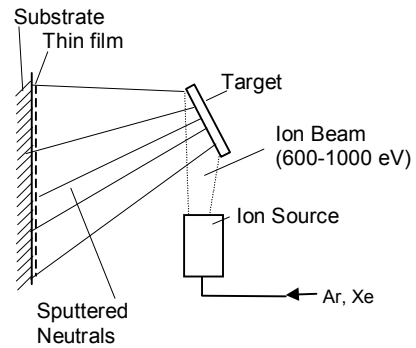
Fig.1: Overview ion beam parameters of our systems

Overview:
Ion Beam Processes for Thin Film Technologies

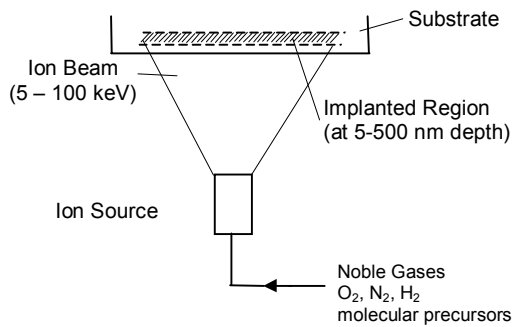
IBAD:
Ion Beam Assisted Deposition



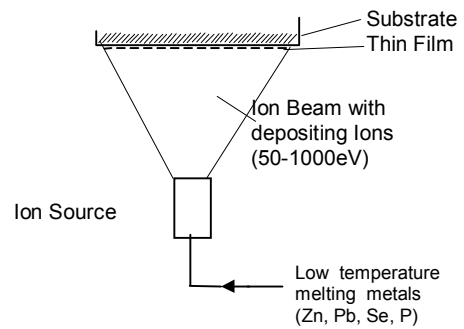
DIBS:
Direct Ion Beam Sputtering



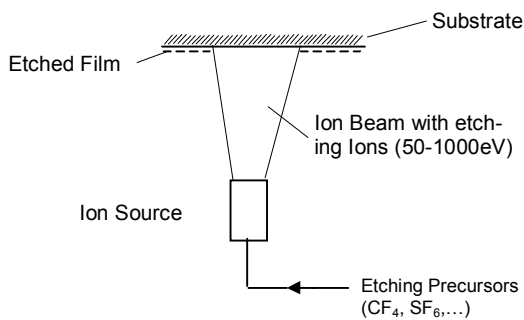
Ion Implantation



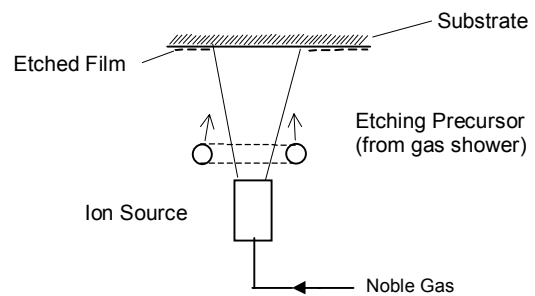
DIBD:
Direct Ion Beam Deposition



RIBE:
Reactive Ion Beam Etching



CAIBE:
Chemical Assisted Ion Beam Etching



Ion source type	ion energy	Ion beam dimensions	ion source type
K 40 MIS	20 - 1000 eV	40 mm diameter	mass separated filament ion source
ACC 40 IS	20 - 1000 eV	40 mm diameter	alternating cold cathode ion source
ACC 30 x 150 IS, ACC 40 x 300 IS, ACC 40 x 600 IS	20 – 1000 eV	30 x 150 mm. 40 x 300 mm, 40 x 600 mm	Linear alternating cold cathode ion sources
ACC 30 x nnn IMP	1 – 60 keV	nnn mm ion beam	Broad ion beam implanters with linear ACC ion sources
ACC 80 PS	10 – 150 eV	80 mm plasma stream diameter	alternating cold cathode plasma source

Tab.1: Overview JENION ion beam systems



3. History

- 1994:
JENION was founded, first tests of mass separating ion filters and hot cathode ion sources.
- 1995-1996:
Building up of our ion-beam-laboratory at Schorba near Jena, publication of the principle of the broad beam ion mass filter [1], development of the mass separating system, first broad ion beam implantation experiments [2].
- 1997-1998:
Start of the production of the mass separating broad ion beam systems, several publications on applications of these systems in ion implantation and surface modification [3,4].
- 1999-2001:
Development of the Alternating Cold Cathode principle leading to reactive gas stable plasma sources [5], production of first ACC- ion- and plasma sources (ACC-40 IS).
- 2000 – 2001:
Development of the alternating cold cathode plasma source ACC-80 PS as a low energy ion source.
- 2001 – 2003:
Development of multiple plasma probe analyzer for measuring plasma parameters and plasma an ion beam profiles (“Plasma Mon”),
Development of the ACC ion source for low temperature melting metals for low energy metal ion implantation,
First production and development of inline stepper motor driven substrate holders for plasma- and ion beam processing.
- 2003:
Production of the first broad beam ion implanter with a linear ACC ion source, (together with DMS-Dresden GmbH),
Development of linear ACC ion- and plasma sources with ion beam length from 150 to 600 mm, development of halogen lamp heaters for plasma- and ion beam processes.

3. Recent projects and developments

- Ion beam impurity analysis of mass filtered broad ion beams (project with Institut for Surface Modification, Leipzig, www.iom.uni-leipzig.de [9], 1998).
- Reactive ion beam etching (RIBE) of quartz glass with ACC-ion sources, max. etch rate 1µm/min, (contribution to projects at Institut for Surface Modification, Leipzig, 1999).
- Development of microstructured and other electrode systems for plasma generation at high pressure up to atmospheric pressure (contribution to a bmbf-project of Roth&Rau AG, Hohenstein-Ernstthal, www.roth-rau.de [6,7], 1999 – 2001),
- Refinement of microwave plasma sources for use in industrial photovoltaik thin film deposition (contribution to developments of Roth&Rau AG, Hohenstein-Ernstthal www.roth-rau.de [8], 2000 – 2002).
- Solar cell technology of mc-silicon wafers (contribution to projects of Roth&Rau AG, Hohenstein-Ernstthal [10]), 2001 – 2003).
- Development of a method for two dimensional ion beam profile control for broad ion beams (project together with Institut for Surface Modification, Leipzig, www.iom.uni-leipzig.de 2001-2003).

4. Future projects

- Complete solutions for plasma- and ion beam processing with linear sources.
- High pressure plasma sources.
- Retarding field analyzers for electron- and ion energy distribution analysis at plasmas.
- Broad ion beam implanters and technology.

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