



- 1 Substrate handling in the cleanroom
- 2 Precision coating equipment PreSensLine

PreSensLine

IN-LINE SPUTTERING SYSTEM FOR PRECISION COATING OF LARGE SUBSTRATES

Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP

Winterbergstr. 28
01277 Dresden, Germany

Contact persons

Dr. Daniel Glöß
Phone +49 351 2586-374
daniel.gloess@fep.fraunhofer.de

Dr. Peter Frach
Phone +49 351 2586-370
peter.frach@fep.fraunhofer.de

www.fep.fraunhofer.de

The PreSensLine is a coating system for dynamic coating by reactive pulse magnetron sputtering based on an in-line deposition principle. The equipment allows fabrication of high-precision complex multilayer coating systems, gradient coating systems and freeform coatings on large flat and curved substrates.

Prior to coating, the substrates are applied to the substrate carrier under ISO class-5 cleanroom conditions. Plasma etching for cleaning and magnetrons for the application of adhesion layers are available in the load lock chamber as pre-treatments.

Coating takes place in a process chamber comprising of two coating stations, each equipped with up to three sputter sources. A substrate heater as well as optical and pyrometric in situ measuring equipment is located between the stations.

Our expertise covers process optimization of reactive pulse magnetron sputtering for highly complex customer requirements. This includes to adjust a variety of layer properties to meet the demands from new applications in optics and sensor technology. This is possible by additional degrees of freedom (i.e. process parameters) based on innovative key components and technologies.

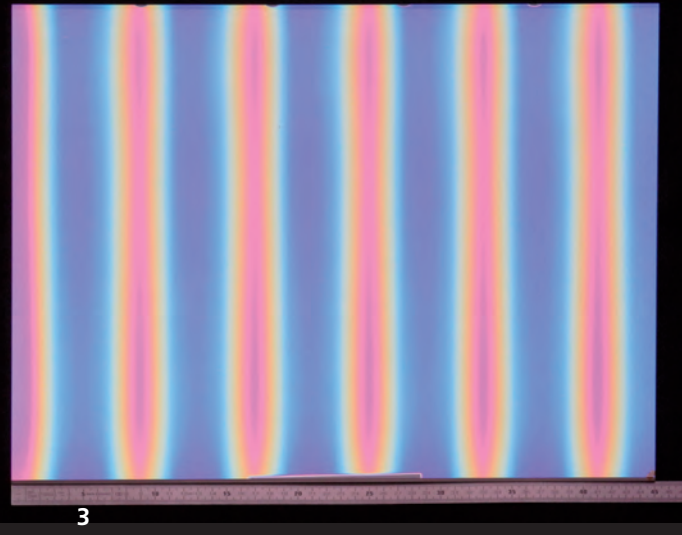
The coating system and sputtering sources employed are designed for precision coatings with low particle generation and characterized by high productivity.

The variety of available materials opens up almost unlimited opportunities for applications such as optical interference layer systems, electrical and piezoelectric layers, active sensor layers as well as protective and barrier layers.

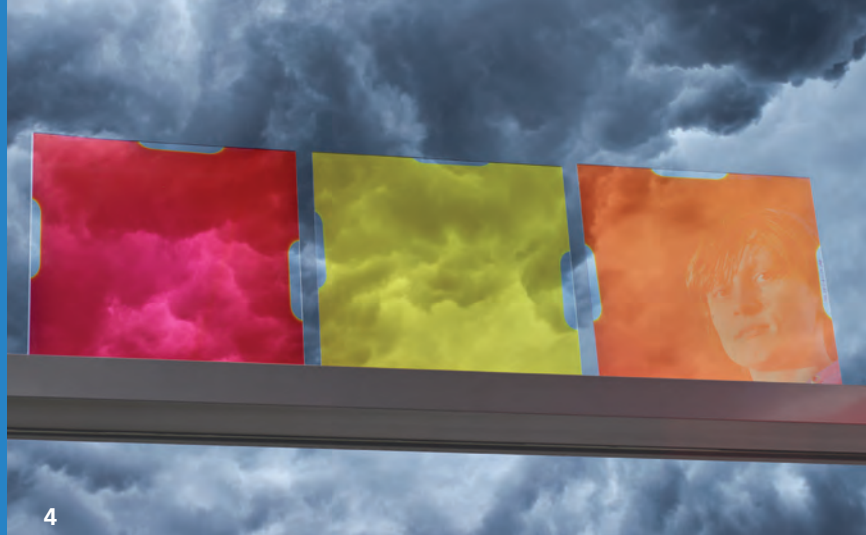


Management
System
ISO 9001:2015
ISO 50001:2011

www.tuv.com
ID: 9105050079



3



4

Technical specifications

Coating process	Reactive pulse magnetron sputtering (two coating stations each with two RM 800 magnetrons)
Substrate handling	Within an ISO class-5 cleanroom
Substrate pre-treatment	Plasma etching (RP 800 Plasmatreater), adhesion layers
Combined substrate movement	<ul style="list-style-type: none"> Very precise substrate translation and rotation by linear and rotation motors, excellent accuracy +/- 0.025 % High dynamics: linear up to 0.5 m/s and 3 m/s², rotation up to 7200 %/s (1200 rpm) and 360 %/s²
Substrate dimensions	650 mm x 750 mm x 120 mm, up to Ø 550 mm for rotating substrates
Optimized design for minimal particle generation	<ul style="list-style-type: none"> Vertical equipment design Carrier guidance only below the substrate area No substrate clamping required thanks to 7° inclination of the system Optimized coating technology and magnetron design for low-particle coating
Base / process pressure	1·10 ⁻⁶ mbar / 1·10 ⁻³ ... 1·10 ⁻² mbar
Inert / reactive gases	Ar/O ₂ , N ₂
Vacuum pump-down system	Oil-free pre- and high-vacuum pumps
Process options	Substrate heating (up to 400°C), substrate bias (DC or pulse)
In situ measurement technology	Ellipsometer, pyrometer

Technologies

- Coating deposited by means of reactive pulse magnetron sputtering with RM 800 magnetrons
- Power supplies with UBS-C2 unipolar / bipolar switching unit (incl. unipolar, bipolar and hybrid pulse modes)
- Reactive-gas process control by Spectrometer-Process Control Unit (S-PCU^{plus})
- Plasma etching for substrate pre-treatment
- Precise substrate movement (high-precision positioning accuracy and speed variation for substrate translational movement with superposed rotation)
- Freeform coatings on 3D substrate surfaces (e. g. on aspherical lenses) by position-dependent control of coating rates

Our offer

- Development and optimization of coating technologies and coating systems for demanding applications in optics and sensor technology
- Coating of samples and pilot production
- Development of key components such as magnetron sputter sources and plasma etchers
- Assistance in the cost analysis and technical implementation
- Transfer of technology and key components (for example of integrated packages) for production facilities

3 Example of freeform coating

4 Large-area dichroic filters

5 Schematic layout of the PreSensLine

