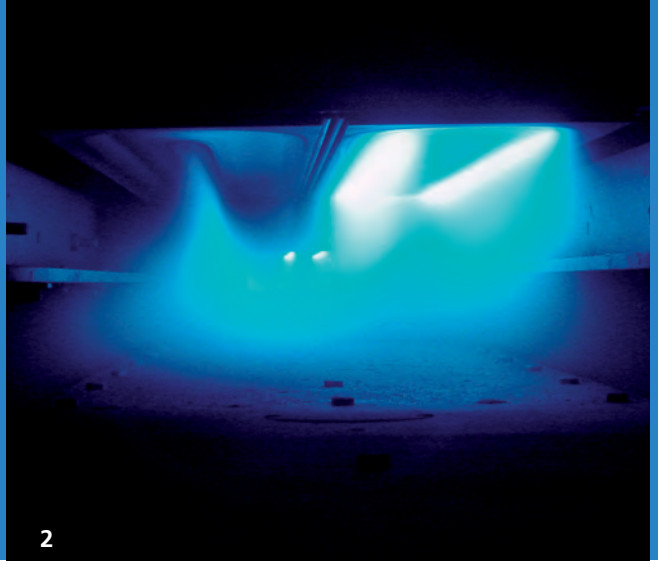


ILA 900

VERTICAL IN-LINE SPUTTERING PLANT FOR COATING LARGE SURFACES





ILA 900 – Coating of large-area flat substrates

Layers and layer systems are applied to flat substrates at the Fraunhofer FEP using sputtering technologies. The special expertise of the Fraunhofer FEP in this field is pulse magnetron sputtering (PMS) and the control of reactive sputter processes. First of all suitable layer systems are identified for specific applications and then the sputter processes are adapted and optimized to the requirements of the relevant tasks. The objective is to deposit layers of high quality at favorable cost.

The Fraunhofer FEP has special expertise here in the development of technological key components for PMS and process control.

The ILA 900 in-line sputtering plant allows layers and layer systems to be applied to flat substrates of size up to 1200 × 600 × 60 millimeters. The plant is designed in a way that up to eight processing stations can be used to deposit metals and metal oxides/nitrides/oxy-nitrides reactively or from ceramic

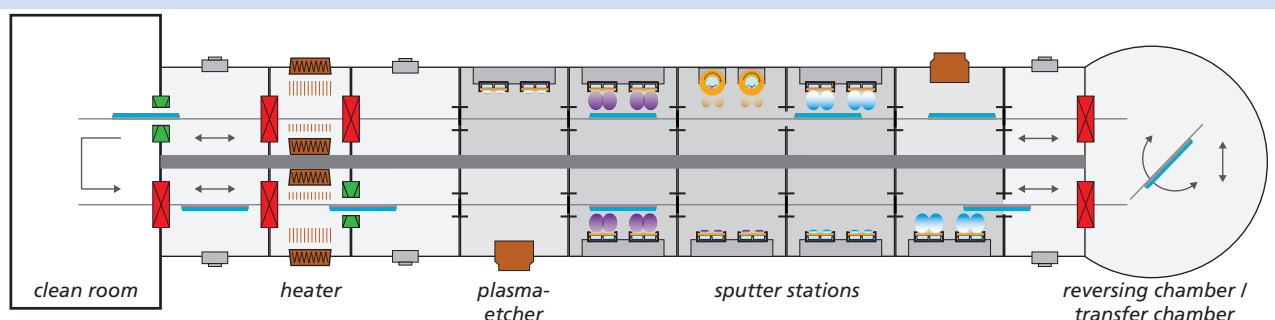
targets via unipolar or bipolar magnetron sputtering. This can be carried out on either one side or both sides.

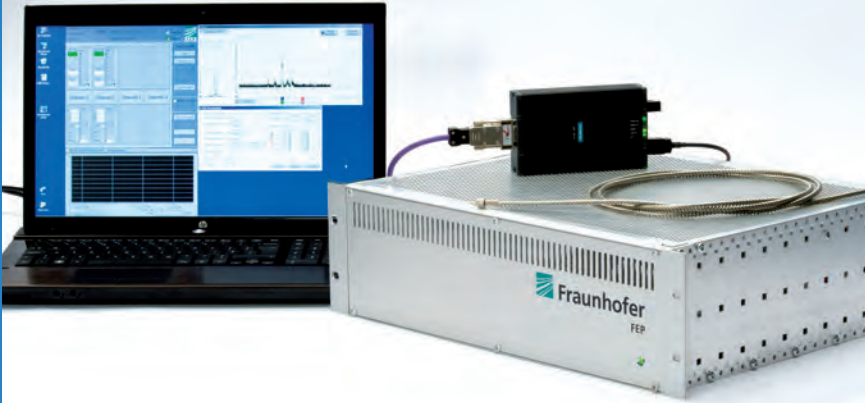
Example applications of the layers and layer systems are architectural glass (low-E coatings/solar control coatings), transparent conducting electrodes (TCO), and electromagnetic shielding (EMI) and antireflection (AR) coatings and antireflection-antistatic (ARAS) coatings in displays in electronic and photovoltaic devices.

Technologies

- clean room conditions for substrate treatment
- coating on one or two sides
- substrate pre-treatment:
 - RF sputtering
 - substrate heating up to 500°C (radiation heater)
 - industrial cleaning (washing and drying plant, disinfectant)
- DC or pulsed magnetron sputtering:
 - DC sputtering up to 60 kW
 - pulse sputtering (sine) up to 100 kW
- pulse sputtering (square) up to 60 kW
- non-reactive and actively stabilized reactive sputtering processes
- single or dual magnetron sputter system (DMS system), planar or cylindrical targets
- layer thickness homogeneity over 600 mm coating width: ± 1.5% (material-dependent)
- in-situ monitoring:
 - layer resistance via contactless measurement
- optical transmission of the substrate
- substrate temperature via contactless measuring points (pyrometer)
- optical plasma emission for process control
- partial pressure: Mass spectrometer, lambda sensor for oxygen
- real-time measurement of the substrate temperature (and the carrier) via a thermocouple (radio data transfer)
- in-line temperature stabilization of the substrate (up to 250°C)

5 Schematic representation of the ILA 900 plant





Technical specifications

multi-chamber in-line plant with:	<ul style="list-style-type: none"> ▪ 2 heating chambers ▪ 1 measurement chamber ▪ 8 process chambers which can be fitted with: <ul style="list-style-type: none"> ▫ 5 planar DMS systems, target length 900 mm ▫ 2 × 2 planar single magnetrons, target length 750 mm ▫ 1 rotatable cathode DMS system, target length 780 mm ▫ 2 inverted RF sputter-etchers, length 750 mm ▪ parallel and separately operable plant sides (connected via the reversing chamber and transport table in the clean room)
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base pressure: 2×10^{-6} mbar

working pressure: $10^{-4} \dots 10^{-2}$ mbar

process gas inlet: H_2, O_2, N_2

standard substrate size: 1200 mm × 600 mm × 60 mm
(larger dimensions on request)

substrate speed: 0.1 ... 6 m/min

target-substrate distance: 80 ... 150 mm

Our offer

- feasibility studies on new layer systems for specific applications
- development of sputtering processes for functional layer systems and single layers under near-real production conditions
- small series production for market introduction of new products
- adaptation and supply of key components (for example power supplies, pulse and control units, also as integrated packages) for example for modernizing or expanding existing production plants

TITLE PHOTO

Overview of the ILA 900 vertical in-line sputtering plant

1 Layer system developed on the ILA 900 for baroque mirrors in the historic Grünes Gewölbe (Green Vault) Museum in Dresden, © Thomas Ernsting

2 Plasma in a DMS process

3 S-PCU (spectrometer process control unit) for active stabilization and plasma diagnosis of reactive sputter processes

4 Transparent conducting coating on glass

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

Winterbergstr. 28
01277 Dresden, Germany

Contact persons

Dr. Kerstin Täschner
Phone +49 351 2586-376
kerstin.taeschner@fep.fraunhofer.de

Dr. Jörg Neidhardt
Phone +49 351 2586-280
joerg.neidhardt@fep.fraunhofer.de

www.fep.fraunhofer.de



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