

1 Top view of the rotary table.

EOSS®: ENHANCED OPTICAL SPUTTERING SYSTEM FOR OPTICAL PRECISION COATINGS

The requirements for optical precision coatings are increasing continuously. In addition to the cost of production, extremely high reproducibility and long-term stability as well as a low particle contamination are the key to successful production processes. With the production platform EOSS®, the Fraunhofer Institute for Surface Engineering and Thin Films IST are setting a new standard in the manufacturing of highly complex interference coatings.

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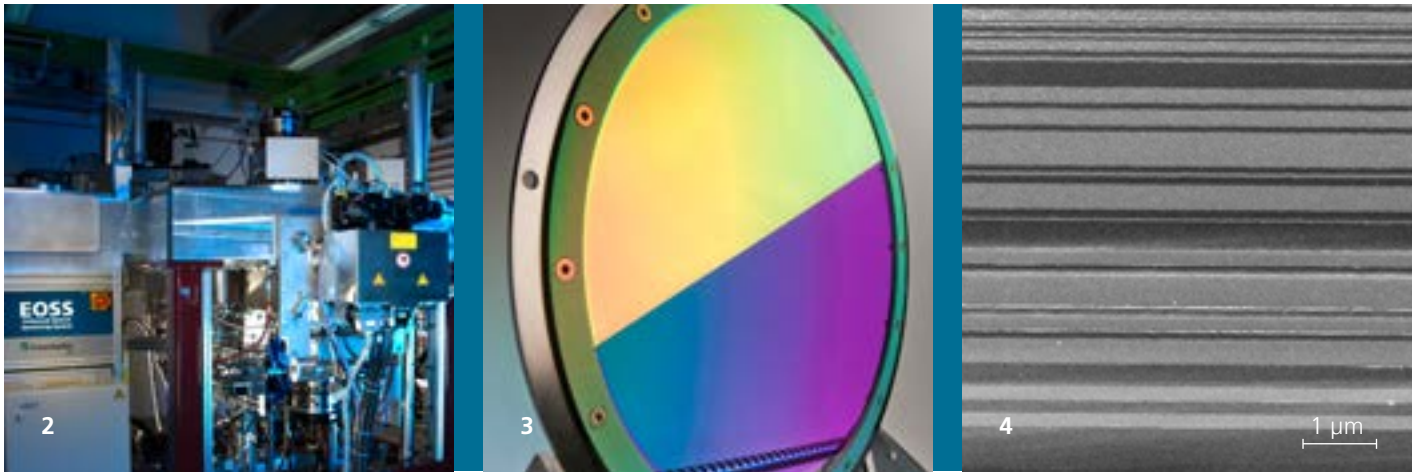
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A powerful platform for enhanced optical sputtering

With the sputtering system EOSS®, Fraunhofer IST made a step forward in high precision optical coating production. The coatings are deposited in a turntable system in up to three chambers by means of magnetron sputtering. Using rotatable targets as source material, the compound-assisted reactive magnetron sputtering (CARS) process results in a stable thickness uniformity of better than ± 0.2 % over

200 mm substrates. Rotatable sputtering in combination with a sputter-up configuration guarantees minimized particle contamination. The EOSS® system is equipped with a plasma source for oxidation and substrate pretreatment as well as with a high-performance heating system. A broad-band optical monitor and the MOCCA+® control software are implemented for fully automated deposition.



Product examples

The pictures above demonstrate the uniformity and the layer growth of the optical filters prepared on the EOSS® sputtering system, showing a performance comparable to ion beam sputtering. Filters which can be produced are, for example:

- Steep edge filters for wavelength-multiplexing
- Multi-notch filters with broad passband for fluorescence or Raman spectroscopy
- Narrow bandpass filters with UV-NIR blocking for optoelectronic applications
- Chirped mirrors for ultra-short pulse lasers
- Broadband antireflective coatings for optical applications

What we offer

The EOSS® coating system allows for a high throughput production of high-end optical coatings for the use in optoelectronics, bio-medical industry, materials processing, and laser optics. With the EOSS® available for prototype coating services, Fraunhofer IST provides solutions for new challenges in optical filter development—from the very first step to the finished filter. This includes material and process engineering, filter design and a broad range of thin film analytical services. The EOSS® system is commercially available.

Technical data

- Turntable sputtering system with rotatable magnetrons
- Coating of 12 substrates with up to 200 mm diameter in a batch
- Magazine system for up to 60 substrates
- Fast carrier exchange in less than 20 minutes
- Target lifetime > 2 months (24/7)
- Longer maintenance cycle due to cylindrical magnetron sputtering
- Deposition rate up to 1 nm/s
- Deposition of filter systems with > 1000 layers possible, filters with thickness > 50 µm already produced
- Broadband optical monitoring with full process automation by MOCCA+®
- Substrate heating up to 300 °C for stable processing

2 EOSS sputtering system at Fraunhofer IST.

3 Optical coating on a 200 mm substrate with an optical density of 6. Top: reflection, bottom: transmission behavior.

4 Scanning electron micrograph showing the growth of layers with thickness between 10 and 100 nanometers.