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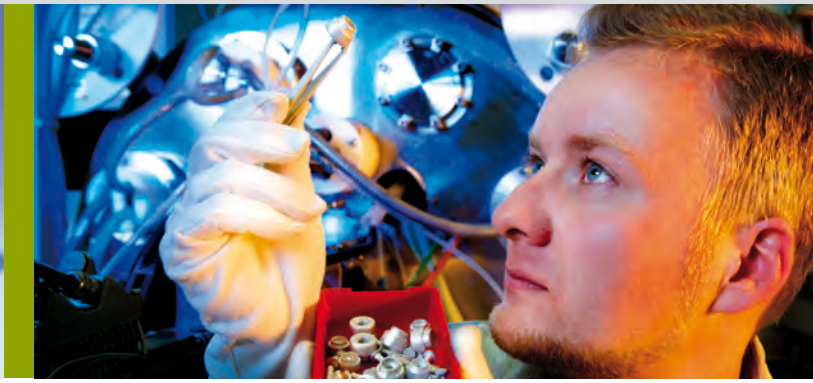


COATING OF SMALL AND MASS-PRODUCED COMPONENTS AS BULK GOODS

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

Winterbergstr. 28
01277 Dresden, Germany

Contact persons

Dr. Fred Fietzke
Phone +49 351 2586-366
fred.fietzke@fep.fraunhofer.de

Dr. Heidrun Klostermann
Phone +49 351 2586-367
heidrun.klostermann@fep.fraunhofer.de

www.fep.fraunhofer.de

The development of coating technologies for small and mass-produced components processed as bulk goods is one field of activity at Fraunhofer FEP.

The advantages of vacuum coating compared to conventional wet-chemical or metallurgical coating processes of small components comprise a high layer quality and a broad range of achievable layer structures. Furthermore, vacuum coating processes are environment-friendly and cost-effective.

At Fraunhofer FEP, a coating plant is being used in which small and mass-produced components can be processed as bulk goods. This plant combines the core technologies of plasma-activated high-rate deposition and pulse magnetron sputtering. Moreover, hollow cathode-assisted sputter-etching paves the way for good adhesion of the layers on the substrates.

Our primary focus is targeted onto the development of corrosion protection layers on rivet elements for the car manufacturing and rail vehicle industries. The requirements concerning corrosion protection are enhanced by the increasing use of material combinations in hybrid design (e. g. metals and reinforced composites). Multilayer vacuum coatings providing corrosion protection, diffusion barrier, and passivation functions have already shown high promise in initial application-related tests.

The developed PVD coating technology can also be adapted for sliding, decorative, scratch-resistant, or abrasion-resistant layers.

Technologies

- Plasma pre-treatment with hollow cathode
- Pulse magnetron sputtering
  - of adhesion-promoting layers
  - of functional layers
- Plasma-activated high-rate deposition
  - of low melting point metals and alloys (e. g. Al, AlMg, Cu, ...)
  - of compound layers through reactive processes
- Combination process for the deposition of alloy and multilayer coatings

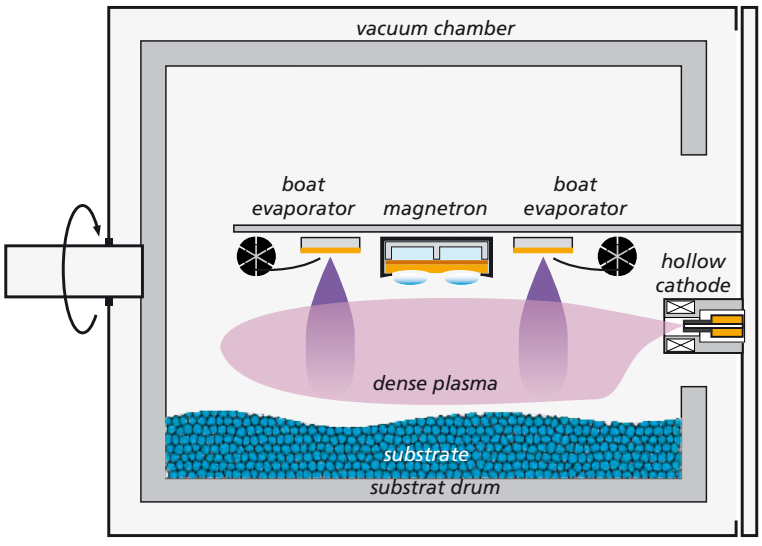
Possible substrates

- Pourable small parts without tendency to clump (pins, balls, rivets, ...)
- Granules
- Powders (by arrangement)
- Max. batch weight: 30 kg
- Made of abrasion-resistant material (e.g. metal, glass, mineral substances)
- Thermally resistant up to min. 200°C
- Intermixable in a horizontally arranged drum (direction of rotation and speed adjustable)

Our offer

- Technology and process development
- Feasibility studies
- Sample coatings for introduction of new products onto the market
- Supply of key components, e. g. evaporators, pulse and process control units
- Technology transfer

4 Schematic representation of the batch plant ALMA 1000



1 Rivet with Al corrosion protection

2 Cross-section of a metallized glass bead

3 Copper coated glass beads

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