

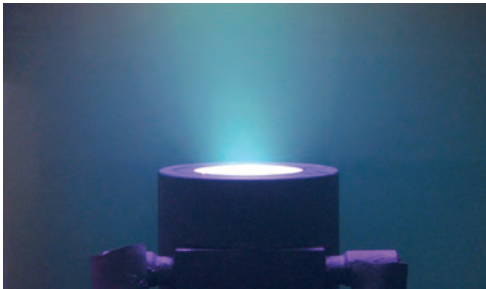


**Fraunhofer**  
FEP

Fraunhofer Institute for Electron Beam  
and Plasma Technology FEP

# Sputter etching

*New compact design of the  
hollow cathode arc source*



*Hollow cathode arc discharge during sputter etching*

Vacuum-based techniques give optimum layer adhesion if the pretreatment step is undertaken prior to the subsequent coating step without interrupting the vacuum. The development of high-quality and commercially viable coatings thus requires simultaneous development of systems for effective substrate pre-treatment.

For flat substrates such as metal sheets and strips, magnetic field-enhanced etchers meet very well the necessary requirements regarding etching rate, processing width, and homogeneity.

The use of hollow cathode arc sources allows thick ferromagnetic sheets and strips and components of virtually any geometry to be pre-treated. Hollow cathode arc sources produce a relatively high plasma density, but allow greater freedom with regards to positioning in the vacuum plant. The side by side positioning of several hollow cathode sources enables the processing of large widths and the necessary homogeneity.

Fraunhofer FEP offers hardware packages for magnetic field-enhanced etchers and hollow cathode-enhanced etchers. The use of high-performance pulse power supplies with integrated rapid arc detection and processing allows high-quality substrate pretreatment by sputter etching at very high rates. The electrical circuitry that has been developed allows the substrates being cleaned to remain at earth potential, so simplifying the plant design.

The pre-treatment methods that are offered are so effective that excellent layer adhesion can be achieved in seconds. This provides the basis for a very efficient, economic processing step.

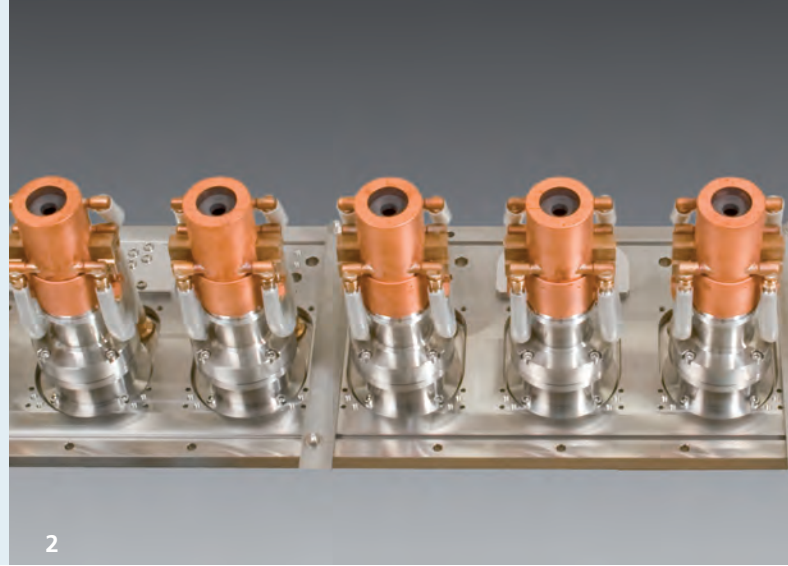
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## Comparison of etching techniques

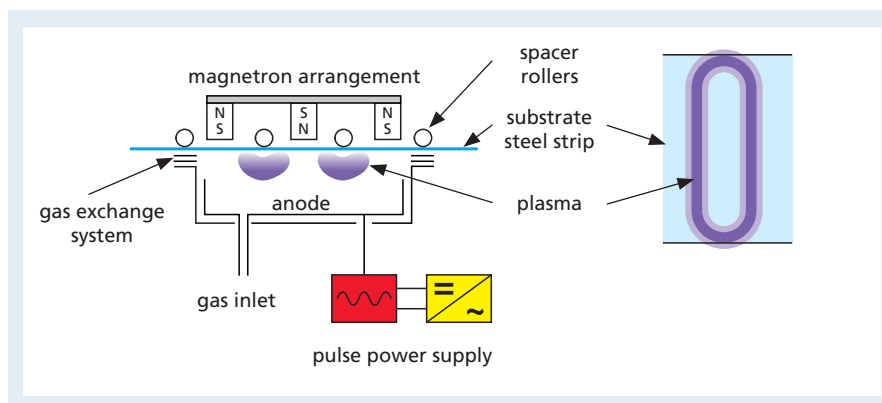
	Magnetron sputter etching	Hollow cathode sputter etching
<b>Substrate shape</b>	Flat sheets and strips	Any desired shape
<b>Substrate material</b>	Metals	Metals (can also be used for pre-treatment of glass, ceramics, polymers)
<b>Substrate thickness</b>	A few millimeters (ferromagnetic metals up to ca. 1 mm)	Any desired thickness
<b>Electrical contact</b>	Earth potential	Earth potential
<b>Homogeneity</b>	Very homogeneous	Characteristic distribution (→ arrangement of sources)

## Technology

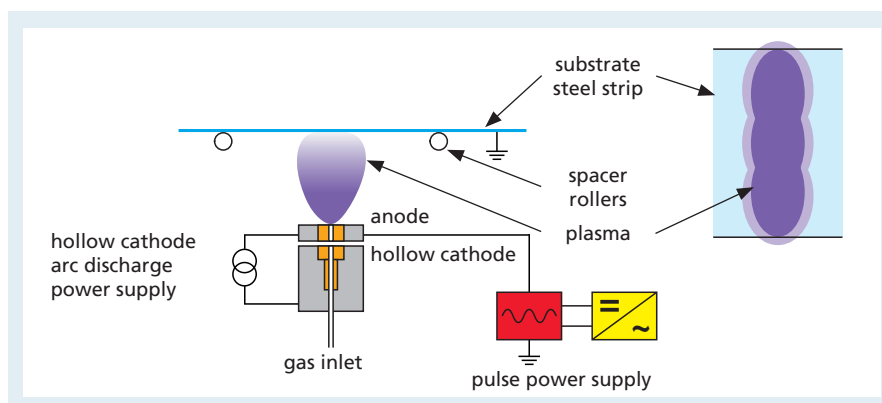
- Sputter etching of metallic substrates of any desired geometry with argon ions (gas mixtures are possible)
- Etching of components, sheets, and strips that are at earth potential
- Prevent defects by using MF pulse technology and rapid quenching of arcs
- Plasma treatment of insulating substrates is also possible

## Our offer

- Development of add-on and in-built pre-treatment stations
- Retrofitting of existing plants
- Development of complete packages including plasma source, power supply, gas supply, PC control
- Commissioning of plants and instruction
- Preliminary tests, feasibility studies, and process development
- Cost analysis



Magnetron sputter etching



Hollow cathode sputter etching

- 1 Magnetron arrangement in the magnetron etcher
- 2 Arrangement of the hollow cathode arc sources