By reactive and non-reactive magnetron sputtering 2-dimensional samples can be coated with metallic or ceramic films in a thickness of 10 nm to 5 μm in order to improve surface properties of the substrates or to allow complete new properties of the system. The deposition process runs in a noble or reactive gas atmosphere at a pressure of Pa in a dc or r.f. plasma process. Thin films can be realized for protective and functional applications. Multilayer or sandwich coatings with up to four different materials can be realized without breaking vacuum.

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Features
- Single and multilayer modus
- Reactive gas components N₂, CH₄, O₂
- Different coating concepts like nanocomposites, multilayer and graded coatings are possible
- Typical targets: metals, ceramics, glasses
- Protective (wear resistant) and functional (ferromagnetic) coatings

Limitations/constraints
- Max. sample height 20 mm
- Max. four targets
- Target size Ø 75 mm and Ø 150 mm
- No conductive limitations of material
- Directed coating; no coating inside of tubes or holes
- Surface topography and roughness will be reproduced

Materials
Metals, ceramic, glass

Typical structures and designs

Fig. 1: PVD Thin film deposition facility Leybold Z550

Fig. 2: Fracture surface of a TiN/ZrN multilayer coating
By reactive and non-reactive magnetron sputtering two- or three-dimensional samples can be coated at temperatures between 200 °C and 400 °C with metallic or ceramic films in a thickness of 100 nm to 5 μm in order to improve surface properties of the substrates or to allow complete new properties of the system. The deposition process with balanced and non-balanced magnetron regime runs in a noble or reactive gas atmosphere in a pressure range of Pa in a plasma dc process. Plasma cleaning process before coating is mandatory. Rotating of samples is commonly used.

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Features
- Three fold rotation
- Stop and go modus (two fold rotation in front of one target)
- Reactive gas components N₂, CH₄, O₂
- Multilayer and graded coatings possible
- Typical targets: metals electrical, conductive ceramics

Limitations/constraints
- Max. sample height 350 mm
- Temperature range 200–400 °C
- Electrical conductive substrate
- Max. two conductive targets
- Directed coating; no inside coating of tubes or holes

Materials
Metal, ceramic
By r.f. or dc reactive and non-reactive magnetron sputtering as well as microwave plasma source deposition two-dimensional samples can be coated at temperatures between 100 °C and 900 °C with metallic or ceramic films in a thickness of 100 nm to 5 μm to improve surface properties of the substrates or to allow complete new properties of the system. The deposition processes are running in gas atmosphere consisting of Ar, N₂, O₂, CH₄ and/or C₂H₂ in a pressure range of 0.1 Pa and 10 Pa. Plasma cleaning process before coating is mandatory. The samples are fixed on the substrate holder. A dc or r.f. substrate bias can be applied.

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Features
- Using of max. 3 magnetrons and 2 microwave plasma sources simultaneously
- Reactive gas components N₂, C₂H₂, CH₄, O₂
- Multilayer and graded coatings and nanocomposites possible
- Typical targets: metals electrical, conductive ceramics
- No substrate rotation

Limitations/constraints
- Max. sample height 10 mm, max. sample diameter 75 mm
- Temperature range 100–900 °C
- Electrical conductive or non-conductive substrates
- Max. 3 conductive or non-conductive targets
- Directed coating; no inside coating of tubes or holes

Materials
Metal, ceramic