

# Possibilities offered by plasma-based magnetron sputtering processes for the synthesis of functional thin films and surfaces

4. Piezotronics and piezo-phototronics

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## **Abstract text**

Magnetron Sputtering (MS) is a low-pressure plasma-based process. It is a mature, industry-relevant, technique for depositing functional thin films, even on large substrates such as architectural glasses. During MS, plasma ions are accelerated towards the cathode surface by applying an electrical potential. The ion bombardment provokes the ejection of the surface atoms, inducing the so-called sputtering phenomenon. The sputtered atoms condense on the neighboring surfaces and form a film whose thickness can be controlled with nanometer precision.

In this presentation, we will explain what are the “knobs” available to control the plasma characteristics and the way the sputtered atoms condense on the surfaces because this is the key to tailor the physico-chemical characteristics of the thin films. In this respect, MS offers the possibility to design thin film with chemical compositions ranging from pure metals to alloys, from metal oxides to nitrides or carbide compounds, ... Depending on the working parameters, the thin films can be amorphous or (poly)crystalline, porous or dense.

Furthermore, we will present advanced MS processes such as Glancing Angle Deposition (GLAD), which allows controlling the nanostructure of the film with a high-level of precision, and sputtering onto liquids which allows producing colloidal suspensions of nanoparticles.

MS might enable the development of thin film materials relevant in the field of nanogenerators and piezotronics.