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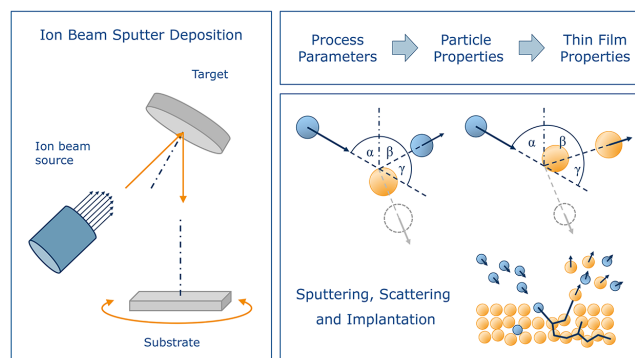
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## Ion beam sputter deposition allows tailoring of thin film properties

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Overview of ion beam sputter deposition highlights this technique's advantages over other physical vapor deposition processes.



Optics, electronics and other industries require thin films with specific characteristics. While the ion beam sputter deposition technique has been in use for over five decades, its full potential was not realized and utilized until recently.

In their tutorial, Bundesmann et al. describe fresh findings pertaining to ion beam sputter deposition. The authors report that this technique, in contrast to other physical vapor deposition techniques, can tailor thin film properties to a wide range of desired attributes.

This versatile tailoring is possible because the ion beam source, target and substrate are physically separate, meaning that geometrical parameters, in addition to ion beam parameters, can be varied. These variations result in different energy distributions of the particles that ultimately form the thin film, which alters the thin film's properties, including structure, composition, surface roughness, mass density, optical properties, stress and electrical resistivity. Bundesmann and Neumann determined that the scattering angle and ion species are the most important process parameters for controlling thin film properties. The authors also showed that scattered primary particles have a strong effect on thin film properties, while energy and incidence angle of the primary ion beam have only a minor effect.

A comprehensive understanding of ion beam sputter deposition is needed to utilize its full potential, so Bundesmann and Neumann also provide a general overview of the systematics, experimental setups and fundamental physical aspects in their tutorial. Bundesmann said that he hopes the tutorial will help its readers design experiments according to their individual goals.

Next, the authors plan to apply their knowledge of ion beam sputter deposition to help academic and industrial partners optimize this technique.

**Source:** "Tutorial: The systematics of ion beam sputtering for deposition of thin films with tailored properties," by Carsten Bundesmann and Horst Neumann, *Journal of Applied Physics* (2018). The article can be accessed at <https://doi.org/10.1063/1.5054046>.

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