

FEMS EUROMAT23

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FEMS EUROMAT is the most important international congress in materials science and technology in Europe. It continues a successful congress series promoting the transfer of knowledge and the exchange of experience between academia and industry. **Submission deadline: 31 January 2023**

Area A: Functional Materials

A04: Charged Particle Induced Nanomaterials

Charged particles play an essential role in the controlled synthesis of functional nanomaterials. The interaction of these particles with matter plays a key role in their final properties and/or drives the synthesis method. The study of these interactions is, however often limited to a specific field of research. Noticeably, similar yet independent, activities to elucidate these fundamental aspects are the focus of specific research disciplines/areas. The lack of broader interdisciplinary studies is partially caused by the size of the interaction area and hence the field of applications. Technologically advanced methodologies such as ion implantation, plasma-enhanced chemical vapour deposition (PECVD), and sputtering rely on broad beams to address extensive areas for high throughputs. Complementary, focused particle beams open up the possibility of exact, localized synthesis with individual feature sizes down to the lowest nanoscale. That enables material modification via focused ion/electron beams (FIB / FEB) or additive manufacturing via focused ion/electron beam-induced deposition (FIBID / FEBID). These focused beam techniques are of particular relevance allowing true direct-write processing on almost any material and surface topology, which complements traditional, resist-based micro-/nanofabrication approaches. FEBID / FIBID also allows accurate direct-write fabrication of complex 3-dimensional architectures representing an accurate 3D nanoprinting technology.

Although somewhat surprising at first sight, both fields of applications have many common research questions to tackle. Therefore, this symposium covers the broad area of fabrication technologies using charged particle beams with particular emphasis on related materials due to their decisive role. This also includes insights from an application point of view to understand current and upcoming needs in that direction. Consequently, this symposium is intended as a platform in which progress, achievements, and remaining challenges of charged particle beam-related technologies/applications are discussed in an open way to go beyond current limitations. The symposium is therefore focused (but not limited) to the following topics:

- Charged particle beam fundamentals: ion/electron-matter interactions, gas dynamics, deposition/modification/etching/sputtering, theory, and simulations, ...
- Charged particle beam-induced nanosynthesis: dissociation processes, structural/chemical dynamics, rational design, novel precursor concepts, ...
- Advanced technological processes and materials: controlled etching/modification/purification, hybrid methods involving other deposition techniques (PVD, CVD, ALD, ...), 3D nanoprinting, simulation guided processing, ...
- Applications: (3D) electric/magnetic/magnetic/optical concepts, superconductivity, physics of granular media, actuators, scanning probe microscopy, hard coatings, ...
- Trends: symbiosis with other lithography methods (TPA, EHD, ...), plasma processes, computational / simulation tools, ...

Symposium Organizer



Priv.-Doz. Dr. Sven Barth
Goethe University Frankfurt



Prof. Dr. Rosa María Córdoba Castillo
University of Valencia



Prof. Dr. Diederik Depla
Gent University



Ass.Prof. Priv.-Doz. DI Dr.techn. Harald Plank
Graz University of Technology

