EUROMAT 2019 / Area D

SYMPOSIUM: D2

Title: Microscopy at the forefront of nanostructured materials characterization and correlation with modelling

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Abstract

Microscopy offers breakthroughs on structure-property relations of advanced materials, facilitating innovation. This symposium focuses on the characterization of materials nanostructures, compositions, and properties, through advanced electron and scanning probe microscopies and associated spectroscopies. We also invite contributions connecting microscopy and modelling, involving energetical relaxation or simulations of the imaging process. The symposium will cover both established and novel materials, nanomaterials, heterostructures, interfaces, defects, and nanoscale phenomena.

Scope:

Continuous advances in electron and scanning probe microscopies are delivering new discoveries of nanostructures, nanomechanisms, and phenomena, enabling better materials understanding and engineering. Electron microscopy is the prominent tool for direct structural and compositional visualization, and quantitative determination down to the atomic scale. It comprises a range of methods and spectroscopies that become particularly versatile when combined with high precision measurements and image or spectra modelling. A lot of progress concerns *in situ* approaches for establishing structure-property relationships. At the same time, atom probe tomography is a distinct rapidly developing approach to provide nanoscale compositional analysis. In a synergistic approach, microscopical investigations utilize atomistic/energetical simulations by methods that span length and/or time scales. This symposium invites contributions on the methods, expanding the current state of the art, and on their applications to the study of nano and bulk materials.

Targeted Topics:

- ✓ Advancements in imaging and diffraction by (S)TEM and HR-(S)TEM
- ✓ 3D electron and atom probe tomographies

- ✓ 3D electron diffraction and crystallography
- ✓ Electron holography
- ✓ *In situ* characterization by TEM and scanning probe methods
- ✓ Spectroscopies including EELS, EFTEM, EDX
- ✓ Quantification approaches including image simulations for the determination of composition and strain
- ✓ Atomistic/energetical simulations of nanostructures and structure-property relations in synergy with microscopy
- ✓ Nanostructures, nanomaterials and low dimensional systems (quantum dots, nanoparticles, nanowires, 2D materials)
- ✓ Heterostructures, interfacial structures and phenomena
- ✓ Epitaxial semiconductors and defects
- ✓ Metals, alloys, ceramics, phase transformations, and plasticity
- ✓ Energy storage or energy conversion related, functional, and smart materials
- ✓ Soft matter, biomaterials, polymers and low-ordered systems