

SIMULATIONS OF POLYMERS AND POLYMER COMPOSITES FROM PETROL AND BIOLOGICAL SOURCES

TRACK NUMBER (1600 MULTISCALE AND MULTIPHYSICS SYSTEMS)

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ABSTRACT

The minisymposium focuses on classical petrol-based and novel bio-based polymers with particular interest in modelling, simulation, and links to experiments. Depending on the problem of interest, microscale, macroscale as well as scale-bridging approaches may be suitable means to identify and reproduce the material behaviour appropriately.

This minisymposium **invites contributions in the field of computational treatment of polymers and their composites** based on profound theoretical knowledge and / or experimental evidence. In particular, contributions addressing structure-property relations and coupled multi-physics problems covering, e.g., chemical reactions, biological processes, electromagnetism, or phase transformations, are highly welcome. Furthermore, aspects of uncertainty quantifications related to the aforementioned fields are of specific interest.

Possible contributions may discuss

- **Materials:** Thermosets, thermoplastics, elastomers, gels, liquid crystal elastomers, and bio-inspired materials as well as composites and nanocomposites thereof;
- **Structures** in 3d (bulk polymers), 2d (membranes), and 1d (fibres including muscle fibres);

- **Mechanical properties:** Viscoelasticity, plasticity, damage, creep, fracture, adhesion, instability;
- **Links to experiments:** Testing techniques (e.g. DMA, DMTA, etc.) and strategies to characterise the material behaviour;
- **Engineering applications:** Additive manufacturing, 3d printing techniques, smart materials and (in-situ) sensors, materials for energy storage purposes, life-cycles issues including processing conditions and production methods, service conditions, long-term performance, aging, recycling, and sustainability;
- **Physical states:** Melts, solids, semi-crystalline and amorphous polymers and their evolution (polymerization, curing, and crystallization during processing);
- **Coupled problems:** Piezo-elasticity, electro-elasticity, magneto-elasticity, flexo-elasticity, photo-elasticity, magneto-rheology, crystallization, effects of physical aging and chemical degradation on the mechanical behaviour;
- **Interfacial phenomena:** Surface and confinement effects, interfaces, and interphases.