

# SOFT MATTER

- **Stimuli-responsive materials**  
*Organic, inorganic and hybrid soft materials that exhibit a property change, or perform a function, upon stimulation with molecular/ionic species, light, electrons, or in response to an environmental change (e.g. temperature, pH, pressure). The topic includes the integration of molecular switches, machines, motors and other active modules in gels, liquid crystals, polymers, thin films, crystalline and amorphous molecular solids, self-assembled structures, stimulus responsive organic and hybrid nanoparticles.*
- **Molecular self-assembly and supramolecular materials**  
*Materials obtained by self-assembly and self-organization of molecular building blocks (micelles, lipid bilayers, vesicles, monolayers and films). Supramolecular and coordination polymers. Porous materials and host-guest compounds. Soft materials based on mechanically interlocked (rotaxanes, catenanes, knots) and topologically nontrivial (helicates, threaded and intertwined species) molecular assemblies.*
- **Colloidal particles and nanoparticles**  
*Colloidal inorganic nanocrystals and nanoparticles characterized by size dependent chemical and physical properties. Colloidal organic nanoparticles, nanocapsules, nanoclusters, core-shell nanoparticles. Colloidal chemistry synthesis, wet synthesis, shape and size control. Colloidal nanoparticle. Surface and interface functionalization and engineering.*
- **Self-organized nano- and meso-structures**  
*Nanostructured superlattices, hierarchically organized mesostructures. Nanoparticle arrays. Patterned organized nano- and mesostructures. Directed assembly, collective properties in self-organized mesostructures. Biomimetic self-organization of nano- and meso-structures. Biological self-assembling materials.*
- **Organic, polymer and hybrid nanostructures**  
*Nanostructures made by polymers, organic materials, nanocomposite materials and hybrid systems. Polymer and organic nanofibers, composite nanofibers. Nanoribbons, nanotubes, nanobelts and nanowires made by polymers, organic compounds and composites. Nanostructured polymer surfaces. Soft lithographies and advanced nanopatterning techniques for polymers and organics. 3D polymer and hybrid nanostructures. Additive manufacturing of polymer and hybrid nanostructures.*
- **Computational and experimental methods for soft matter**  
*Modelling of electronic, optical, magnetic and mechanical properties of polymers, molecular compounds and soft materials. Energy and charge transfer processes in molecular systems. Multi scale modelling. Quantum mechanical and quantum chemical description of complex molecular and organic systems. Advanced experimental characterization of electronic, optical, magnetic, structural and mechanical properties of polymers, molecular compounds, hybrid materials.*
- **Bio-soft materials**  
*Biomacromolecules, biopolymers, biological polymers, bioinspired materials. Synthesis and properties of proteins, DNA, polysaccharides, glycoproteins. Fluorescent proteins. Molecular and protein diffusion. Biological interfaces.*