SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Department of Materials Science - CENIMAT / I3N

Soft Materials

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- Graduation Chemical Eng,, IST
- DSc, PhD and MSc Materials Science, FCT/UNL and Nato/ Invotan fellow at the Laboratoire de Physique de la Matière Condensée at Nice University, France.
- Current Research Interests: soft materials and complex fluids, namely cellulosic liquid crystals.

Polymeric and Mesomorphic Materials Group
DCM/FCT/UNL and Cenimat / I3N

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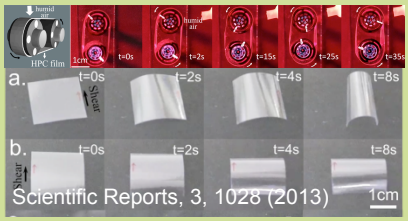
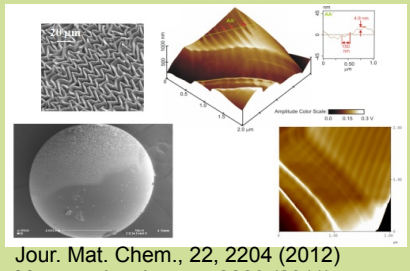
Objectives

Our team (5 PosDoc and 2 PhD students) is involved in different projects. Main topics:
Soft motors; Moisture-driven liquid crystal cellulose engines
Liquid crystal beads and networks; Visualization of the response of nematic and cholesteric liquid crystal drops of toroidal topology threaded in cellulosic fibers, suspended in air, and liquid crystalline networks response to an AC electric field at different temperatures over the N-I transition.
Renewable and stimuli responsive cellulosic-based meshes; Manufacture and characterization.
Structural color and iridescence in cellulosic systems; mimic the structures found in plants, namely in *Tulipa* petal gratings.

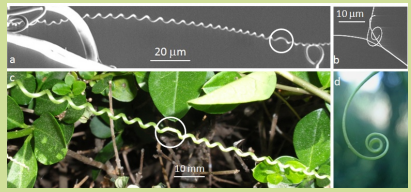


Methodology

Located at CENIMAT: Brucker MSL-300P Nuclear Ressonance (NMR) (operating at 300 MHz (proton), solids and liquids. Special probe accessories for simultaneous rheological-NMR measurements have been developed which allow Rheo-NMR studies. Magnetic resonance imaging (MRI). Rotational rheometer Gemini HRnano-. Langmuir and Langmuir-Blodgett Instrument KSV NIMA.
Located at Science Materials Department: equipments that includes facilities for preparing and characterisation of polymers and liquid crystals: chemistry laboratory, video-polarizing microscopy, image analysis, monochromator, rotational viscometer, Ubbelohde viscometer, melt flow index, mechanical testing, electrospinning - static and dynamic automatic target control, instrument for automated video contact angle metrology and drop shape analysis. Microfluidics.



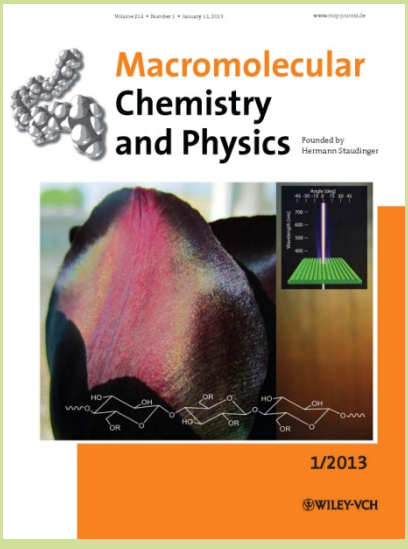
Jour. Mat. Chem., 22, 2204 (2012)
Macromolecules, 44, 2220 (2011)



Soft Matter, 5, 2772 (2009)
Advanced Materials, 20, 1 (2008)

Expected Results

Micromotors that use the chemical potential of liquid water or moist air to produce mechanical or electrical energy.
Use necklaces of liquid crystal drops systems and liquid crystalline networks to study topological defects and their evolution in order to obtain systems for microelectronics and photonics. This liquid crystal systems can exhibit non-trivial point defects, which can be energetically unstable against expanding into ring defects depending on the fiber constraining geometries.
Fabricate networks for separation of water from oil/mixtures and photonic structures using low cost materials in ambient conditions.



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