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FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Department of Materials Science - CENIMAT / I3N

Cellulose in Motion

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

i3N

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UNIVERSIDADE NOVA DE LISBOA

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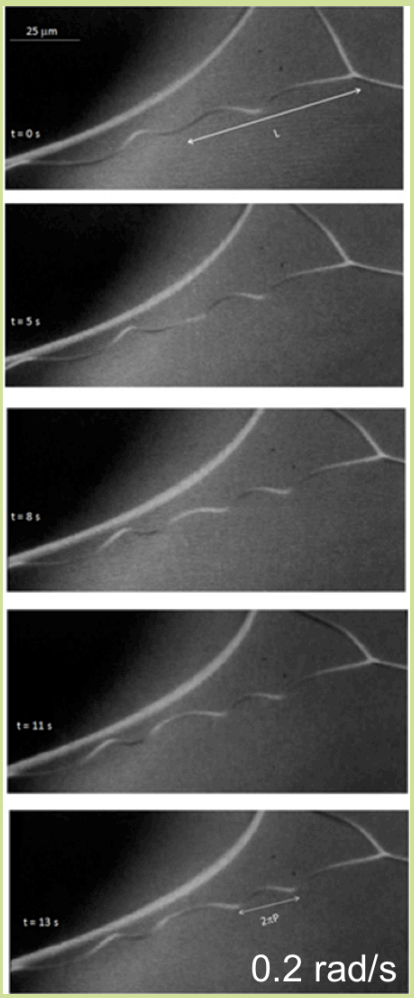
(*Pos-doc* Researcher)

- B.Sc. in Macromolecular Chemistry (EHU, Spain 2004)
- M.Sc in Applied Chemistry and Polymeric materials (EHU and CSIC, Spain 2010)
- PhD in Polymer Chemistry (CSIC, 2011)
- Research Interests: Polymers and liquid crystal physics.

Objectives

Cellulosic aligned networks structurally similar to elastomers, produced from liquid crystalline solutions, can be manipulated in order to produce helicoidal structures and spirals that respond to external stimuli producing bending, unbending and torsion motions similar to movements found in plants. Taking profit of this motions the main objective of this work is to prepare and study the mechanical response of micro and nanofibers prepared from liquid crystalline cellulose based systems. These materials can present different structures (for example helices) and therefore have potential applications in macro, micro and nanoengineering.

The materials are obtained from liquid crystalline solutions by using different techniques (for example electrospinning). The motion of the micro nanowires and films will be affined by controlling the processing conditions and the dimensions of the device.



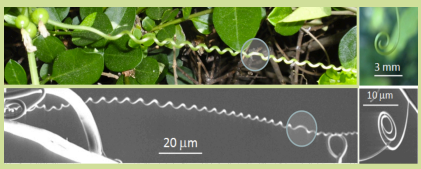
Methodology

- Synthesis of new liquid crystalline cellulose based systems.
- Preparation of new liquid crystalline cellulose systems and composite materials.
- Preparation and study of new oriented micro nano fibers prepared by electrospinning and micrometer thickness thin flexible transparent films.
- Study of the physical relationship that seems to be found between the structures produce from these systems and the movements that they can acquire when actuated by light, different types of solvents and temperature.
- Built up and optimise the characteristics of a new soft motor based on the cellulosic liquid crystal networks prepared.

Expected Results

Understand the motion that micro nanowires can acquire when triggered by light, temperature and different solvents by controlling the processing conditions and the dimensions of the device.

A major attempt will be made to understand, from an experimental and fundamental point of view, the similarity found between these systems in a macro, micro and nano scale and the movements present in plants. The mechanism that is behind the motion observed will be deeply understood.



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