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FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Department of Materials Science - CENIMAT / I3N

Janus Particles

Soft and Biofunctional Materials Group
at DCM/FCT/UNL and Cenimat / I3N

i3N

FACULDADE DE CIÊNCIAS E TECNOLOGIA
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• Industrial Chemistry degree, UBI, 1998.
• MSc in Chemistry , UBI, 2000.
• PhD in Materials Engineering, FCT/UNL, 2006.
• Current Research Interests: Liquid crystals; elastomers; organized structures and *Janus* particles.

Objectives

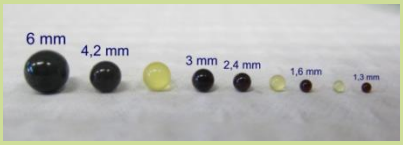
The main objective of this project is to produce spheroidal and ellipsoidal ferrogel bodies and to study their deformation by applying an external magnetic field, in order to obtain new magnetic stress/strain sensors. These materials are also able to tune their optical properties by the application of an external field and therefore have potential applications for magneto-optical sensors. The materials will be obtained from solutions of polymeric matrices, produced as small spheres and ellipsoids that can be filled with ferro nanoparticles and liquid crystals with ferromagnets. It is intended to test several networks (as an example polisiloxane membranes and urethane/urea membranes) as well as several kind of magnetic particles and nematic and cholesteric liquid crystals. The morphology of spherical bodies obtained will be affined by controlling the materials used in their synthesis and the processing conditions.

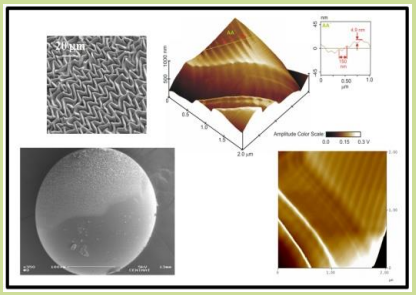
Methodology

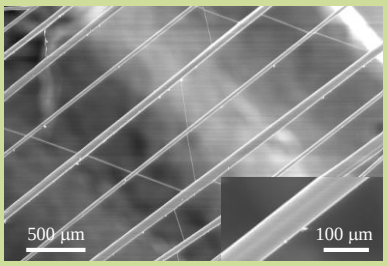
• Synthesis of polymeric networks to be used as soft matrices in the ferrogels bodies.
• Characterisation of the polymers network.
• Manufacturing of small spheres and ellipsoids (with several dimensions) with the soft matrices prepared before.
• Mechanical and optical characterization.
• Combine several ferromagnetic particles according to the structures of the networks prepared and embedded them in the spherical and ellipsoidal bodies produced.
• Physico-chemical characterization of all the obtained materials.
• Magnetic and mechanical optical characterization of the ferrogels obtained.
• Establish the effect of the homogeneous magnetic field in the elastic modulus in the different magnetoelastics.

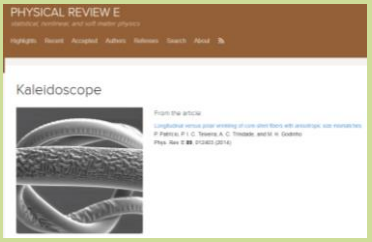
Expected Results

Understand the relationship between molecular structure of the polymeric matrix and the optical and magnetical properties of the new ferrogels produced, concerning to the study of relevant fundamental material science questions regarding the interaction between the ferrofluids and the elastic polymeric matrix, characterized by the spherical body elongation caused by an external magnetic field. A major attempt will be made to understand from an experimental and fundamental point of view of the mechanical and optical properties, static and dynamic, of ferrofluids on the elastomeric matrices.









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