

Department of Materials Science - CENIMAT / I3N

Nuclear Magnetic Resonance Laboratory

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

Portuguese Network of NMR Unit at Cenimat/I3N



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Gabriel Feio

(Researcher)

- PhD in Condensed Matter Physics (1985, Grenoble)
- Researcher at INIC
- Invited Ass. Prof. at IST-UTL
- Invited Ass. Prof. at FCT-UNL
- Current Research Interests: *Molecular dynamics and structure by NMR methods*

Objectives

The activity of the CENIMAT/I3N NMR unit, is mainly directed to material science: soft materials, complex fluids, nanomaterials and glasses. Within these domains of expertise, we have also, as a PTNMR network unit, looked for a strong participation with external research groups covering several main topics:

- Conformational effects micro and nano cellulosic fibers: fibers spun and electrospun from liquid crystalline solutions;
- Rheo NMR of complex fluids: characterization of shear induced textures in complex fluids and structural order and dynamics of cholesteric cellulosic systems under shear and shear relaxation;
- Diffusion on viscous high ionicity ionic liquids (HILLs): study of salt effect;
- MicroMRI of biological systems with clinical applications: microMRI of ischemic and non-ischemic rat liver treated with new magnetoliposomes;
- Nano particles with a potential application as new and high performance Negative Contrast agents for MRI.

Methodology

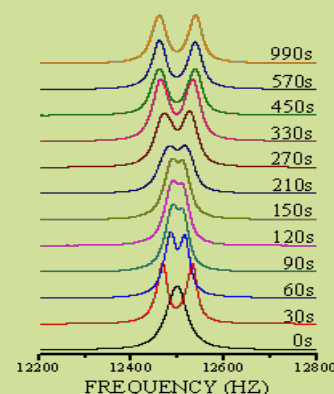
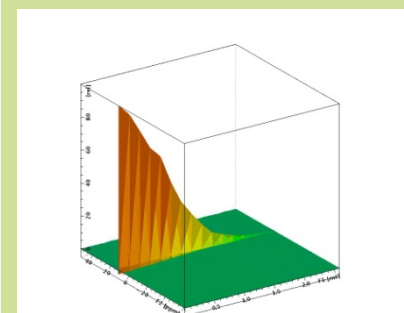
All the NMR methods are applied to obtain an useful scientific information in the mentioned systems, specially the non routine techniques:

- Liquid state multinuclear high resolution spectroscopy
- Solid state multinuclear high resolution MAS/CP/HPD spectroscopy
- Wideline proton and deuterium spectroscopy
- Pulsed field gradient diffusometry
- Magnetic Resonance Microimaging
- Rheo – NMR: Special probe accessories for simultaneous rheological-NMR measurements

Expected Results

To achieve a basic understanding of the macroscopic physical behavior of condensed material systems on the basis of their molecular properties, dynamic or structural, as perceived by NMR spectroscopic or correlated techniques, by an appropriate modulation of the nuclear interactions.

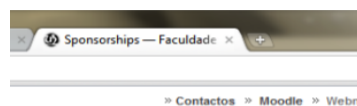
This understanding provides a fundamental tool for an optimal design of molecular structures in order to obtain the desired performance of material systems.



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Portuguese Nuclear Magnetic Resonance Network (PTNMR)



J. Chem. Phys., 133 (17): 174509 (2010)

Soft Matter, 6 (23): 5965 (2010)

Macromolecules, 43 (13): 5749 (2010)