²H NMR STUDY OF INDUCED ORDER IN MOISTURE SENSITIVE **CELLULOSE-BASED FILMS**

A.L.B.S. Bathista*, S.N. Fernandes, P.L. Almeida, G.Feio, J.L. Figueirinhas, M.H. Godinho

Polymeric And Mesomorphic Materials, *andre.silva@cfs.ifmt.edu.br

It is known that thin cellulosic films (~100 µm), prepared by a shear-casting technique, from hydroxypropylcellulose (HPC)/water liquid crystalline solutions can be macroscopically oriented with the director in average along the shear direction [1]. The serpentine locked structure of the director results in anisotropic optical and mechanical properties of the material [2]. More recently it was found that these HPC films behave as liquid crystal networks (LCNs) by showing a strong coupling between orientational order and mechanical strain. Orientational order variation was achieved in the cellulosic films by a humidity difference resulting in changes in sample shape. A cellulose liquid crystal motor extracting mechanical work from a difference in humidity was build up [3]. In this work we used deuterated water to probe the local order of the film by deuterium NMR when it is exposed to different degrees of moisture (see figure). Our study gives insights on the changes of degree of order of the liquid crystalline domains caused by the absorption of water molecules. The results obtained support the interpretation mechanism proposed previously for a cellulose-based motor driven by humidity [3].

1) Mechanism of Interaction and dynamics in HPC by ¹H NMR



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