**Study of magnetic, optical and mechanical properties of thin LC polymer films doped with magnetic nanoparticles**

Smart materials are considered more and more interesting for basic research as well as for technological applications, mainly due to the specific response when submitted to external stimuli (thermal, electric, magnetic or luminous). These materials can find applications in many areas such as artificial muscles, sensors, actuators, micro-robots and micro-pumps. In the case of liquid crystal elastomers (LCE) containing azodyes groups, there is a special combination of self-organization, strong anisotropy and elastic properties, that leads to shape and volume changes tending to occur anisotropically, when subjected to light irradiation (photomechanical response). In the present work, we have investigated thin and free-standing ultra-thin films based on liquid-crystal polymers, azodyes and magnetic nanoparticles. The mechanical, morphological, optical and magnetic properties of the different films were measured. It was found that these properties depends strongly on light irradiation and magnetic field conditions, as well as the dye and magnetic nanoparticles concentration. These results allow a better understanding of the mechanisms involved in the LCE reorganization in the presence of azodyes and nanoparticles, when submitted to light radiation and magnetic field. The insertion of nanoparticles into these elastomers gives rise to a nanocomposite material known as magneto-optical, which allows the exploration of the magnetic and optical properties of the nanoparticles together with the good processability of the polymeric matrix, considering the possibility of activation of the system both by a magnetic field and light radiation.