Title: **Magnetic liquid-crystalline elastomers.**
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Liquid crystals are one of the most studied and applied materials nowadays due to their incredible properties. In this project, we will try to combine the long-range organization of liquid crystals with the elasticity of elastomeric polymers in order to obtain novel materials that respond to an external stimulus and exhibit complex responses after its application. In this case, the chosen stimulus has been the magnetic field. This input energy has great advantages such as the possibility to operate and actuate the material by means of a wireless and directional stimulus. For this purpose, magnetite nanoparticles will be introduced into the elastomeric network following different methodologies.

The ultimate objective of the project is to create new materials (tweezers, simple robots, etc.) that perform complex movements as a response to a magnetic field. Since this research project starts with this TFG, the main objectives of this work are the following ones. First, the synthesis and subsequent characterization (^{1}H NMR and IR) of the different monomers will be performed. Second, the development of different methodologies to prepare the desired magneto-active materials, that is, to integrate the magnetic nanoparticles into the elastomeric network, will be carried out. Several strategies will be considered for this purpose such as the deposition of the nanoparticles on the elastomer surface, the introduction of the nanoparticles into the polymer network by a swelling/diffusion process and the inclusion of the nanoparticles while the elastomer network is forming by means of the spin casting technique. Finally, the response of the prepared materials in front of an external magnetic field will be tested.

Keywords: actuators, elastomers, liquid crystals, magnetic nanoparticles, polymers.