Title: **Magnetic liquid-crystalline elastomers for actuation.**

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Liquid crystal elastomers (LCE) are very useful in engineering and science fields due to the properties that offer. However, their applicability is limited because they don't have the capability of realize complex movements. In order to achieve more sophisticated and faster actuations with this kind of materials, using magnetic field as an external stimulus can be a good option since it permits a fast and remote control.

This project is focused on the preparation and characterization of liquid crystal elastomers (LCEs) with a magnetic behavior. To reach this point, first, magnetite nanoparticles has been functionalized and later characterized using transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS) and a thermogravimetric analysis (TGA).

Then, LCEs have been synthetized incorporating the previously functionalized magnetite nanoparticles with the purpose of obtaining magnetoactive LCEs. To study how the incorporation of magnetite influences to the elastomer properties and its order degree, the samples have been characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD) and differential scanning calorimetry (DSC). To know the magnetic behavior of both LCE and functionalized nanoparticle samples, hysteresis curves has been made using a Superconducting Quantum Interference Device (SQUID).

Finally, more sophisticated distribution of magnetite nanoparticles in elastomers have been tested in order to expand the range of applications that this material offers.

Keywords: LCE, magnetism, TEM, XPS, TGA, SEM, XRD, DSC, hysteresis curve, SQUID.