Despite the huge number of displays, tablets, e-readers and other electronic devices available to read text and display information, our society relies on paper as an indispensable way of displaying information. Although paper itself is ideal for printing on due to its flexibility, high reflectivity, contrast, high resolution, portable and low cost, it is a passive information carrier. Paper is very difficult to use as a substrate where any kind of material may be addressed electronically with the aim of achieving active paper displays. For example, some progress has been made in "writing" electrodes on paper. Additionally, fabricating sensors on paper is highly desirable because of the potential low cost and ease of use, but the field is still in its infancy.

This project aims to produce active paper displays. We aim to exploit the optical properties of liquid crystals with the versatility of paper as a displaying substrate, expanding on our previous success in this area to generate a variety of optical effects on paper. Ultimately paper-based sensors will be produced where the optical properties may change under the influence of external stimuli (specific applications will be discussed with prospective students).

The project will involve the synthesis of appropriate liquid crystalline target materials, including low molar mass and macromolecular species, and their liquid crystal properties. Detailed studies of the surface properties will be undertaken through a variety of techniques including surface imaging (SEM and fluorescence microscopy), and their applications as sensors will be explored.

The student undertaking this project will develop expertise and training in materials chemistry and develop skills and know-how on a broad range of techniques, from chemical synthesis to device fabrication and characterisation. These practical skills will be complemented by courses undertaken within the iDTC postgraduate programme of the Department of Chemistry. The student will join the regular discussions and presentations in the Materials group meetings, will benefit from discussions with other staff and researchers in the area of Soft Matter, and will have the opportunity to present the results at conferences and at meetings with our international collaborators.

References