New technologies for electronics fabrication in a time of unprecedented demand

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Project ID: 2228cd1394 (You will need this ID for your application)

Research Theme: Manufacturing The Future

UCL Lead department: London Centre for Nanotechnology (LCN)

Department Website

Lead Supervisor: Carla Perez Martinez

Project Summary:

The demand for electronics is unprecedented, with processors needed for consumer devices and cloud computing. Manufacturing electronics requires technologies for the removal, or etching, of materials. For example, a mobile phone accelerometer consists of silicon shaped into micrometre-sized silicon beams and springs. To carve such features at this scale, machines known as etchers create and direct a plasma towards a target covered with a patterned mask. The plasma removes material in the uncovered areas, leaving behind the desired structure. In this project at the research group of]Dr Perez-Martinez in the London Centre for Nanotechnology](https://www.ucl.ac.uk/london-nano/fabrication-ionic-liquid-ion-sources), the student will optimise a novel safer etching method, based on a technology known as the Ionic Liquid Ion Source (ILIS).

ILIS are needle devices that produce a spray of ions from ionic liquids, a type of liquid composed solely of positive and negatively charged ions. The resulting beam can be used to treat materials. A single ILIS has already been used to etch silicon with competitive etching yields. Ionic liquids are non-volatile and thus an ILIS-based etcher would not require many of the safety fixtures required to handle the toxic gases used by conventional etchers. The student will design, implement and test an ILIS needle array and attached optics for use in industry-scale electronics fabrication. The student will be trained in charged particle physics and in COMSOL Multiphysics for simulation of the devices, and they will gain experimental skills by testing the devices in our vacuum chamber facilities. The student will irradiate silicon targets and use atomic force microscopy and other techniques to determine the uniformity of etching from the array.

Suitable candidates will have a minimum of an upper second-class UK Master's degree in physics, electrical or electronic engineering, materials science, or a related discipline, or an equivalent overseas qualification.