

**P011** Electrospinning using guiding electrostatic fields: towards the rapid-prototyping of three-dimensional nanofibrous constructs.

**Julian H George<sup>1</sup>, Molly M Stevens<sup>1,2</sup>**

*<sup>1</sup>Department of Materials, Imperial College London,*

*<sup>2</sup>Institute of Biomedical Engineering, Imperial College London*

The use of high voltage electrostatic fields to create fibres with nanoscale diameters (50-500nm) is receiving renewed interest. For example, in the field of tissue engineering, the use of nanofibre scaffolds to simulate the natural extracellular matrix environment is being investigated to encourage desired cellular function. To this end, it would be beneficial to gain precise control over the orientation and alignment of fibres throughout an electrospun construct. This is challenging, as during the electrospinning process the polymer jet that forms the nanofibre takes a chaotic path from source to collector. Some control over fibre alignment can be achieved using rotating collectors; however, further control can be gained by use of targeted electrostatic fields.

By modifying the electrostatic field so that it provides a guiding force on the polymer jet, from source to collector, we have been able to control its path and, ultimately, the two-dimensional co-ordinates at which the nanofibre strikes the collector. Through further development of this technique, and interface with computer aided design systems, it should be possible to electrospin three-dimensional constructs with well defined shape and internal nanofibre organisation.