Nanotechnology: Focused Ion Beam System

• **Nanotechnology** describes the science and technology used to control and manipulate matter at the nanoscale.

• **Nanotechnology** is one of the most important research fields for cutting edge science and technology.

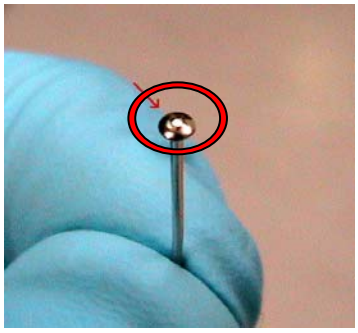
• **Nanometre**: 1/80,000 of the width of a hair, or 1 millionth of a millimetre

FIB: a tool for nano-engineering

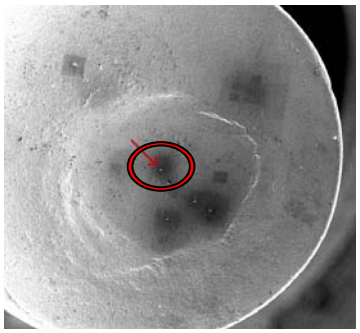
In the Focused Ion Beam (FIB) system Ga^+ ions are created, focused and accelerated toward a surface with large electric fields. The Ga^+ ion beam can then be used to image or to micro-machine a surface.

With the FIB we can build complex structures at the nanoscale.

Probably the smallest University of Leicester logo in the world!



Start with a pin…

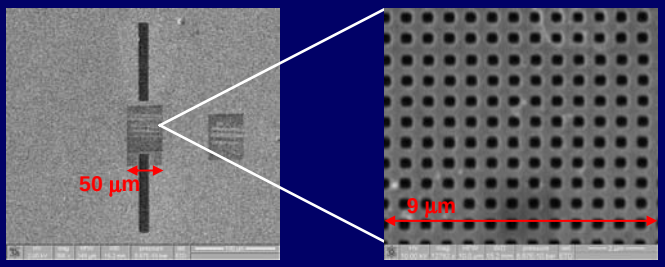


Optical zoom onto the pin head (150x)

Focused Ion beam image (16,105x)

To create the logo we by deposited a 12 x 3 x 0.5 mm layer of platinum onto the pinhead then used the FIB to etch the image into the platinum. The smallest features in the logo area ~ 100 nm.

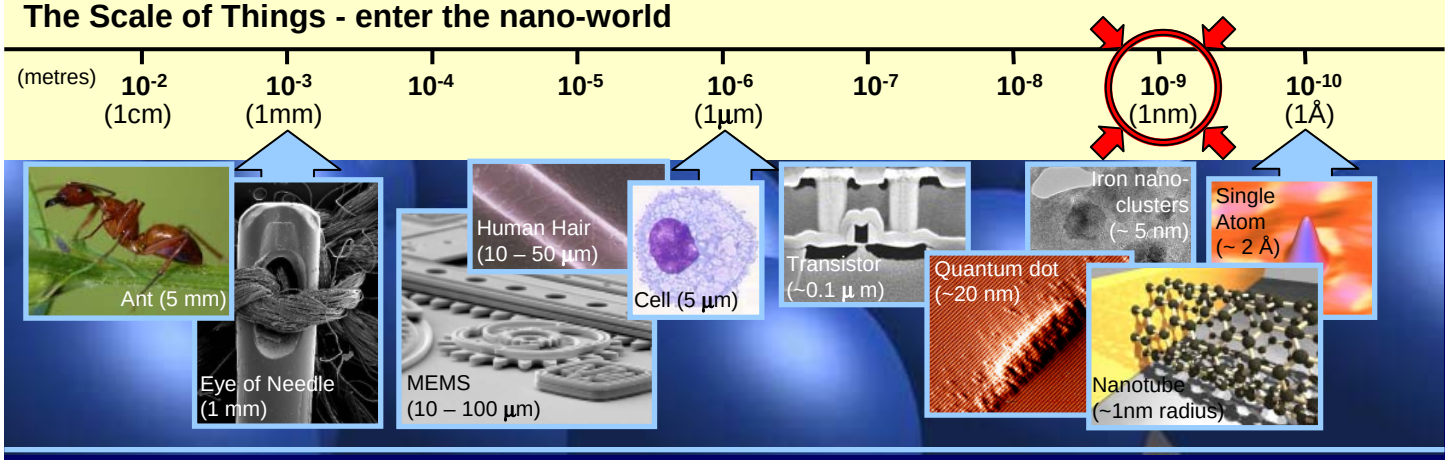
A similar procedure was used to create a regular array of 500 nm gold squares (right). The array has exotic optical properties which can be exploited.



Nano-patterned array: SEM image

Nano-patterned array: FIB image

The Scale of Things - enter the nano-world



Mervyn Roy / Mark Everard