



UK National
Quantum Technology Hub
Sensors and Metrology

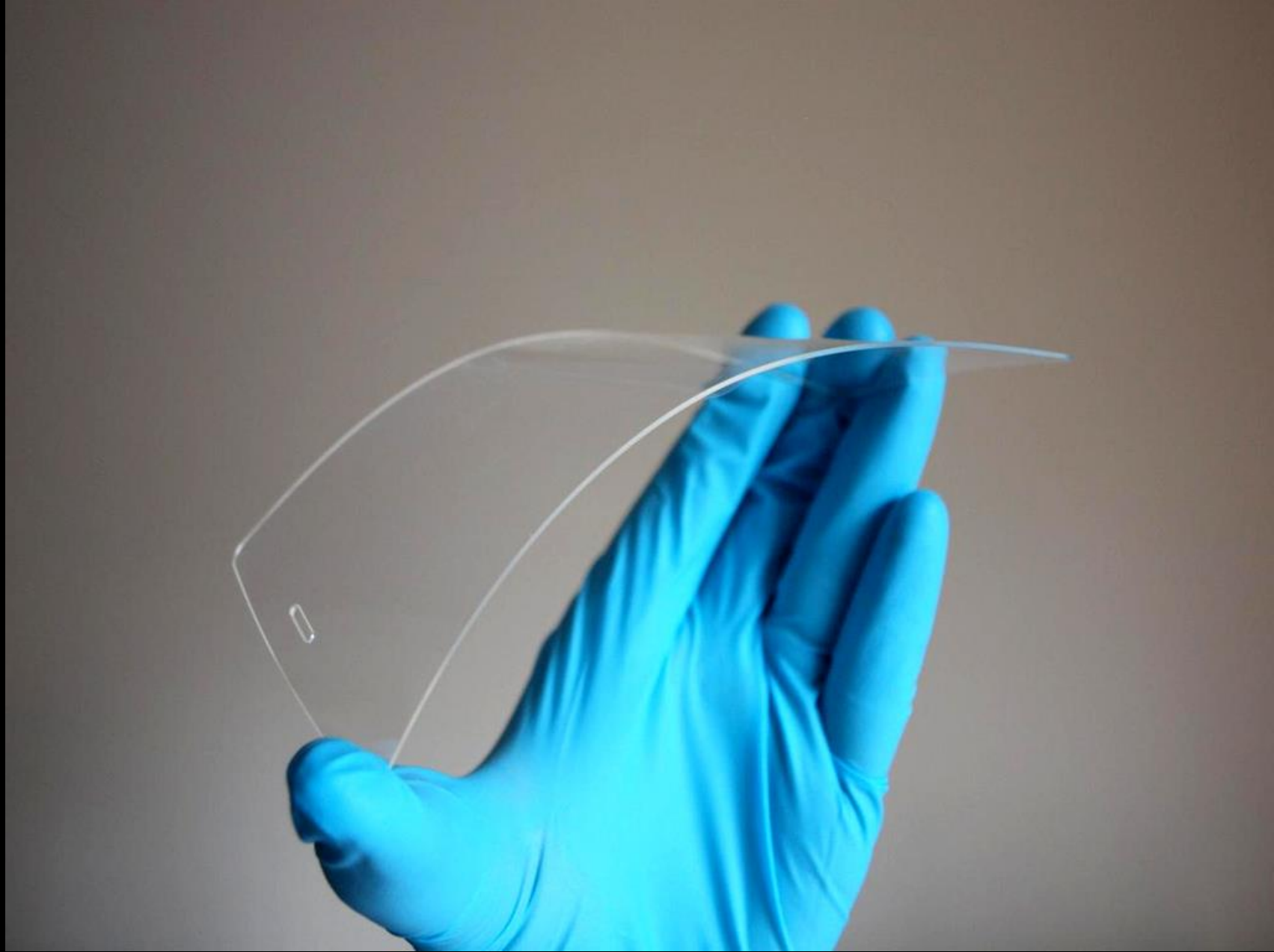
Magnetic microscopy for advanced materials



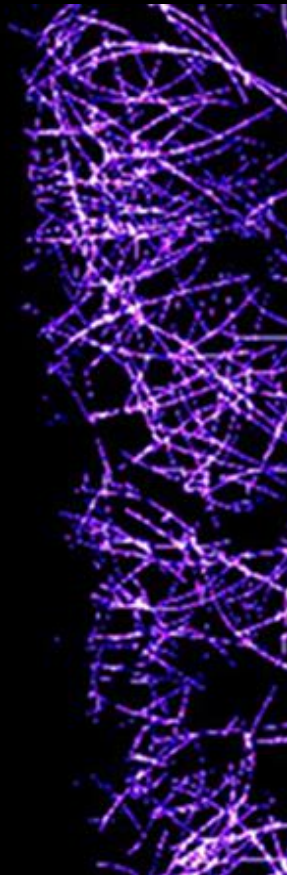
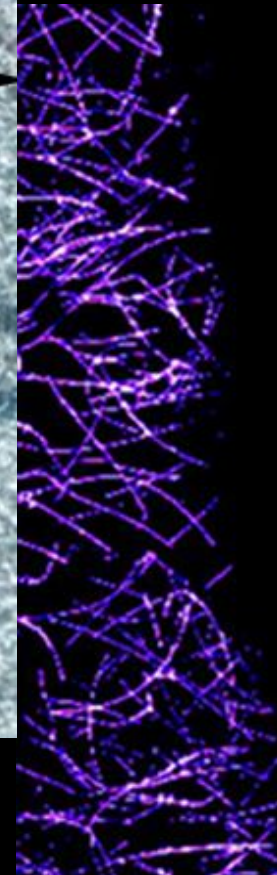
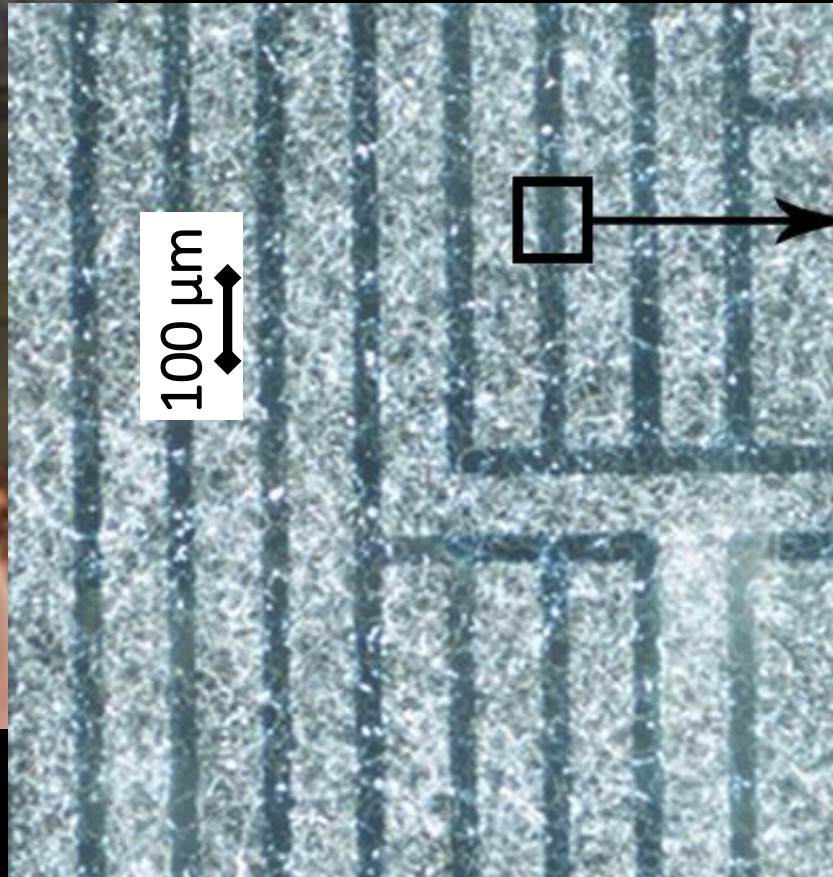
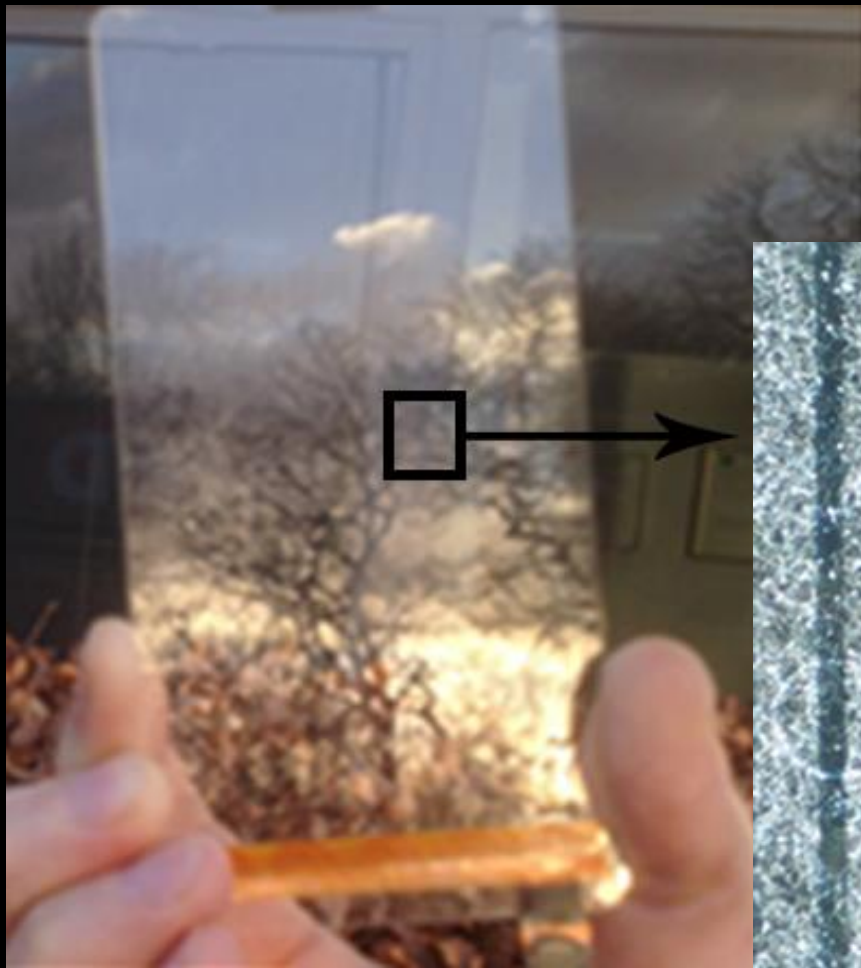
UNIVERSITY
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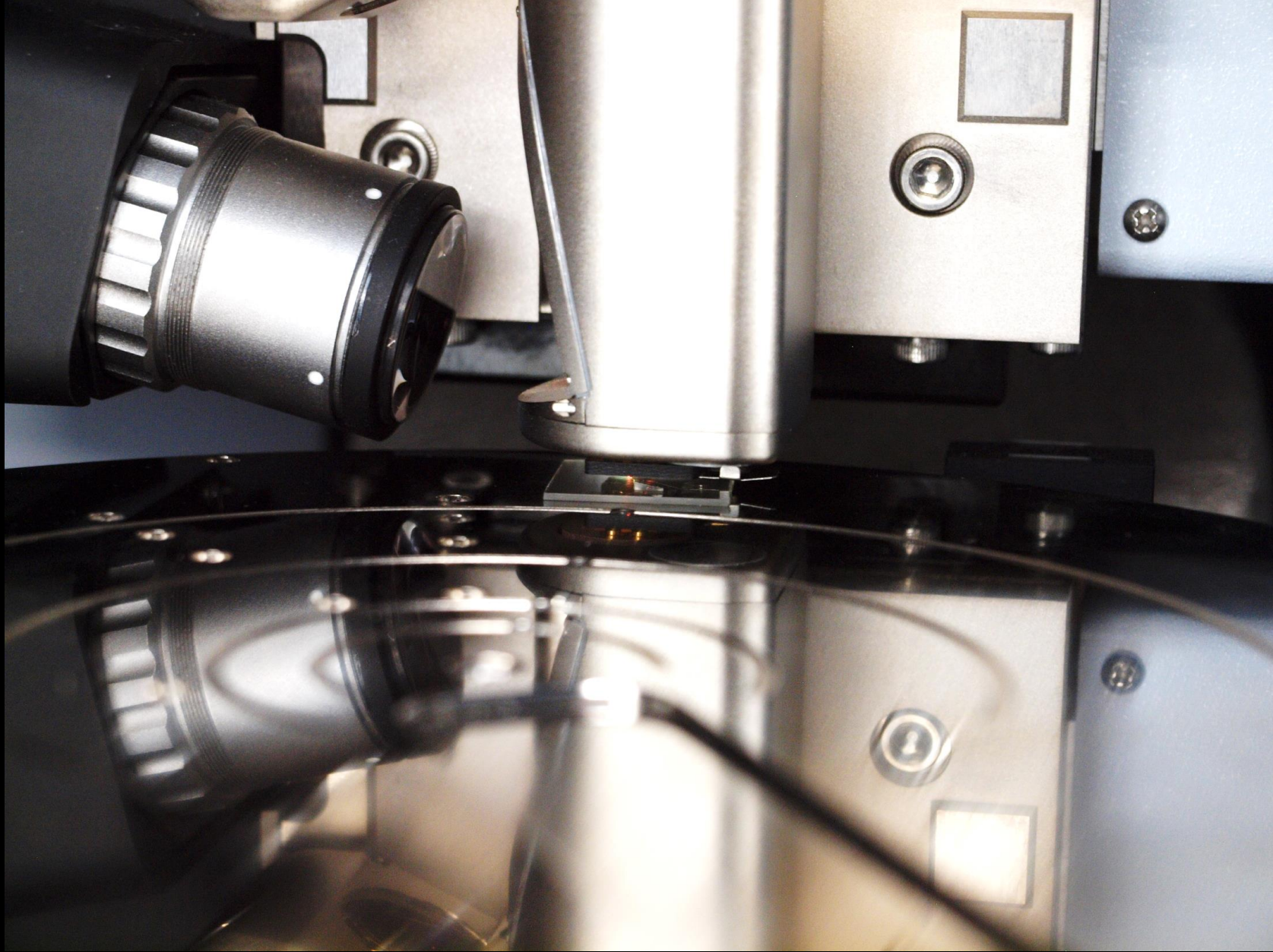
Quantum
Systems & Devices



Transparent electrodes for next generation touchscreens are being developed at the University of Sussex.



They are made of a random network of silver nanowires.

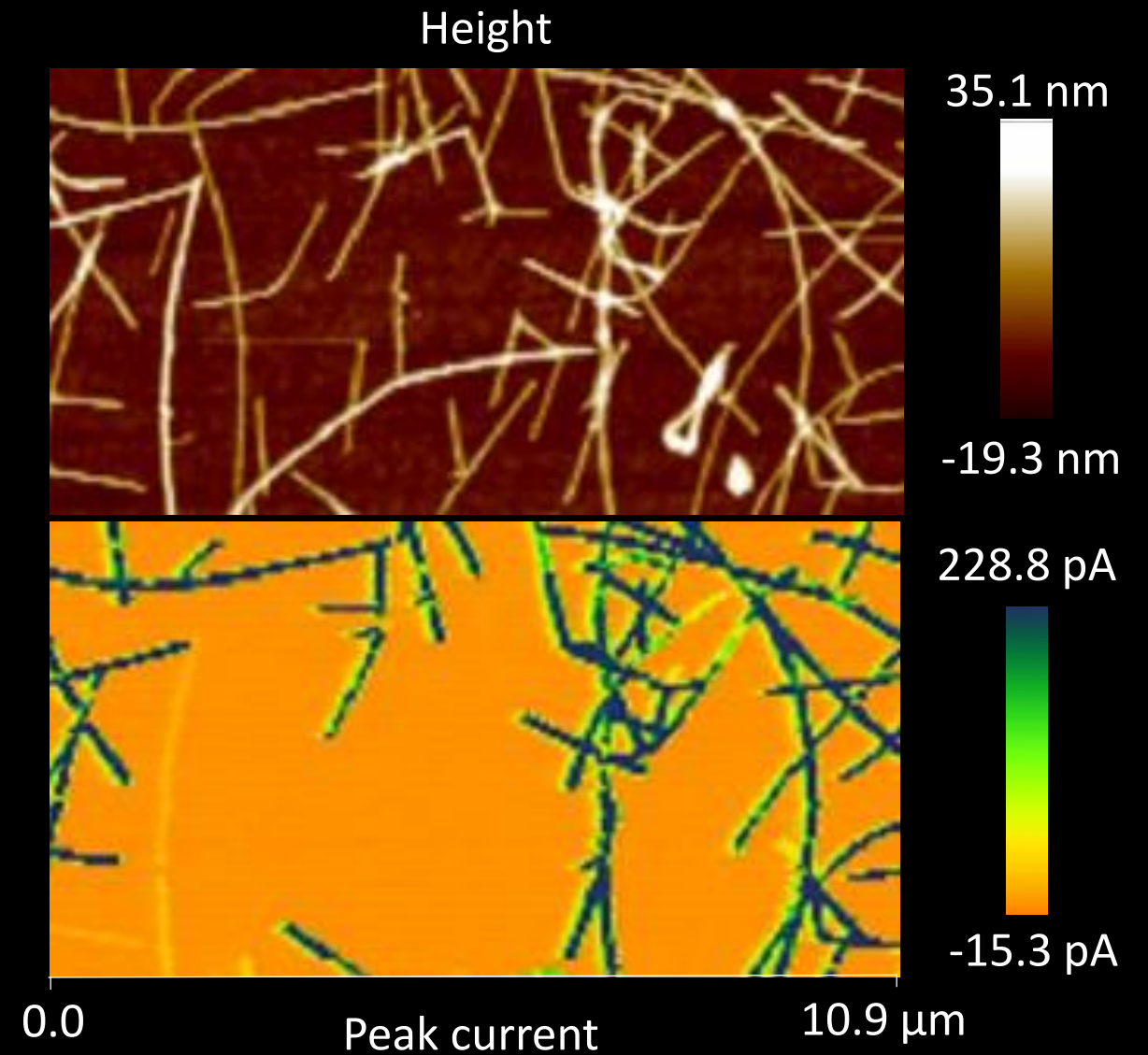


If we take a closer look under a microscope...

Atomic force microscope:

- Topography image

- Conductivity map

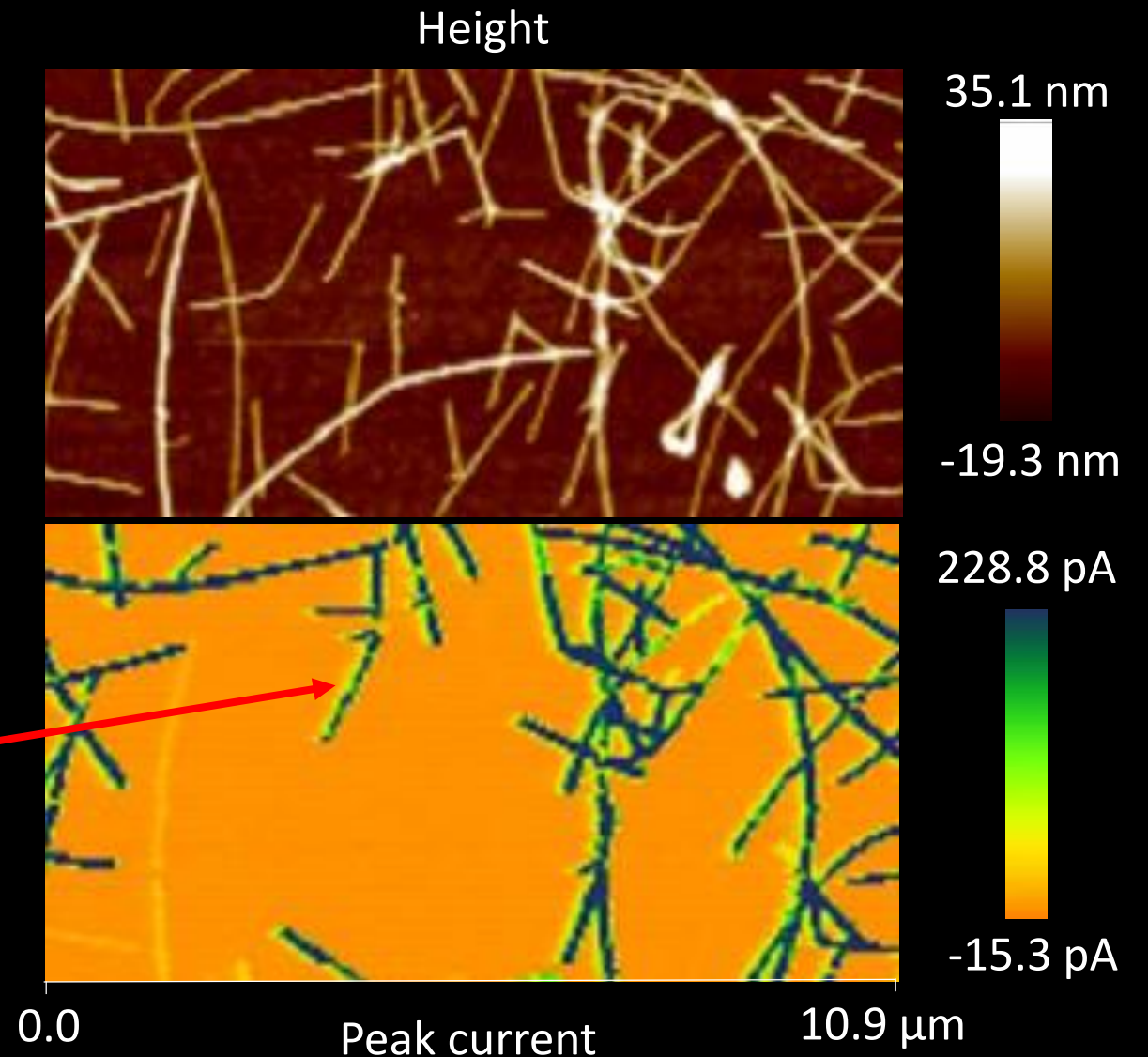


Atomic force microscope:

- Topography image

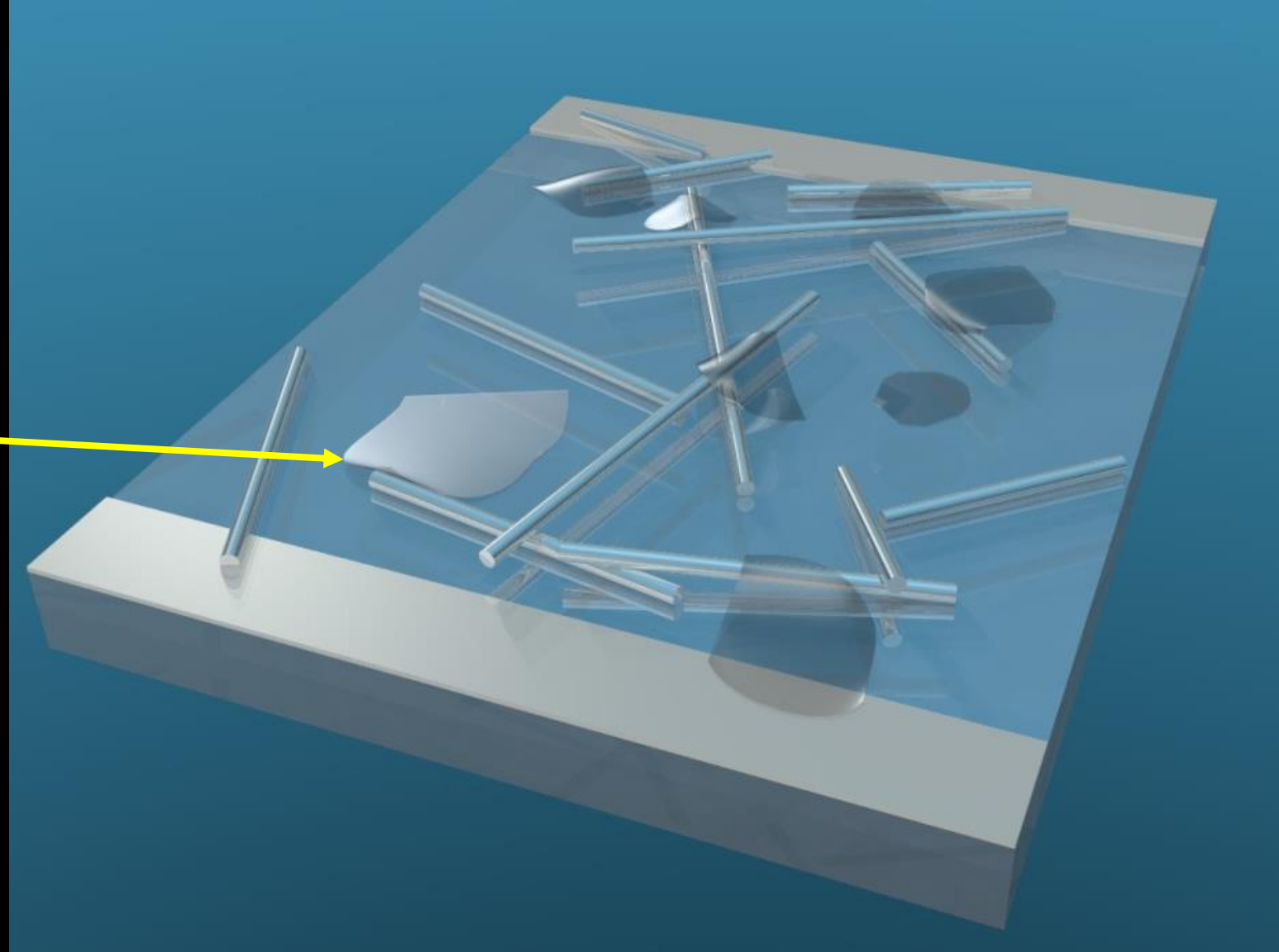
- Conductivity map

Conductive but not part
of active current path



We see that some nanowires are not connected to the network. This limits the performance of the transparent electrodes.

Graphene flake



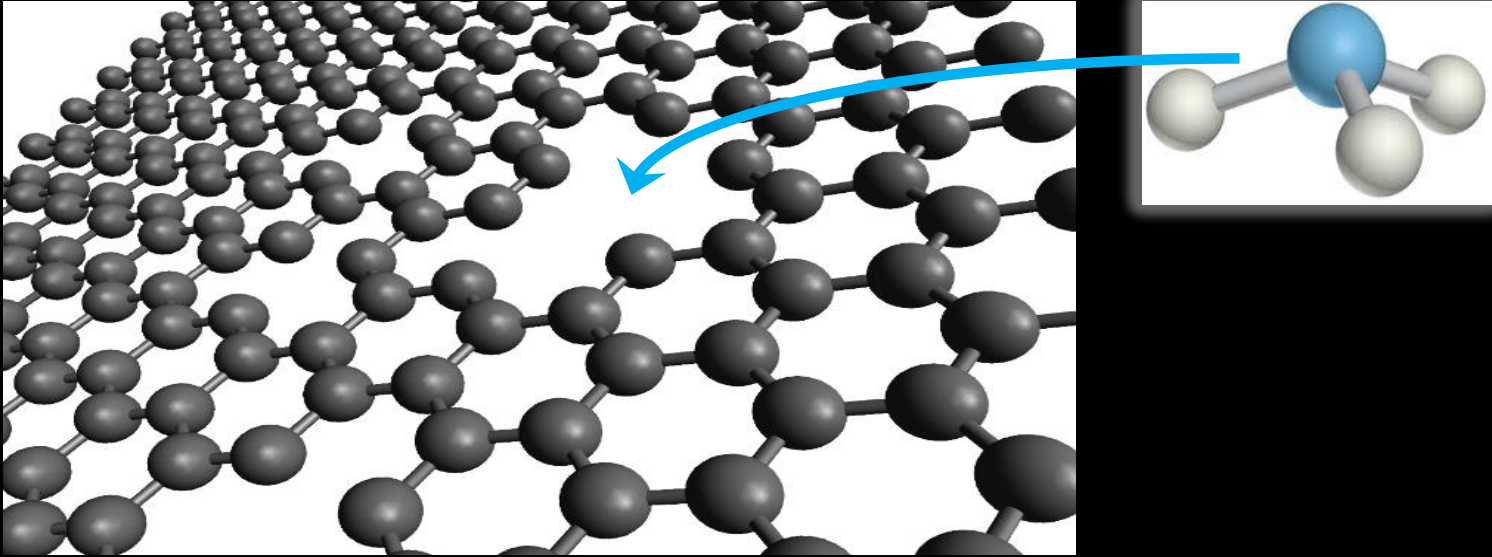
To achieve optimal performance, graphene is added...

Graphene flake



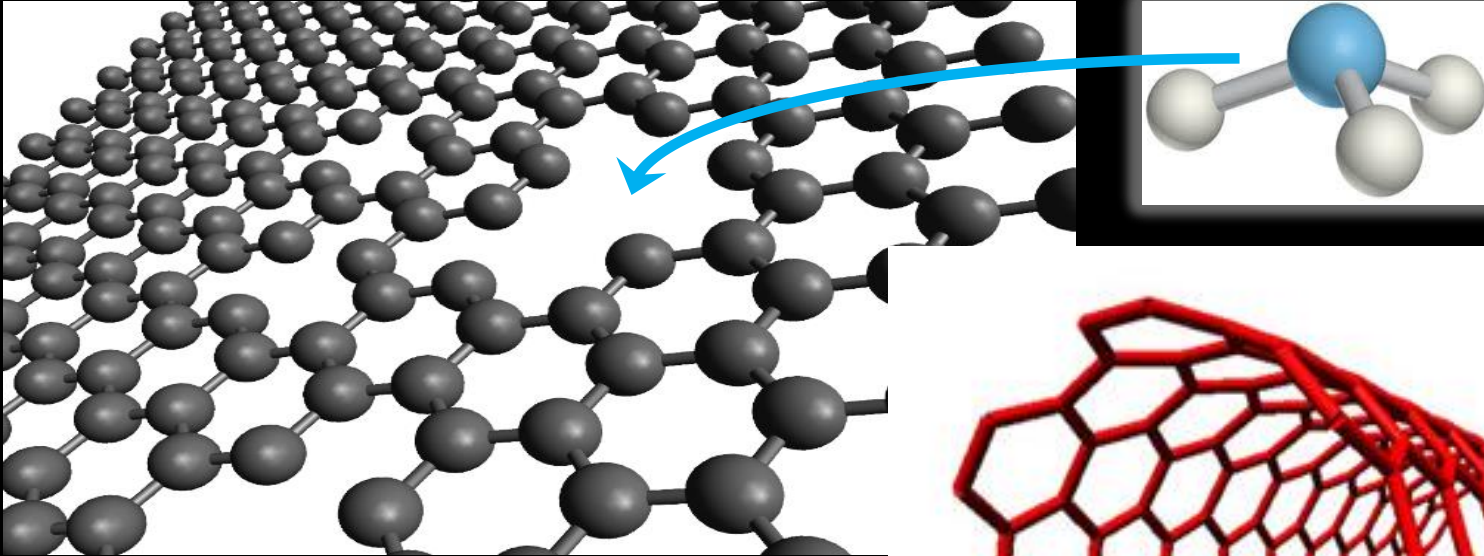
... and a conductivity map is necessary to identify failure mechanisms and to optimise performance.

Other examples where conductivity mapping is likely to lead to a breakthrough in technology:

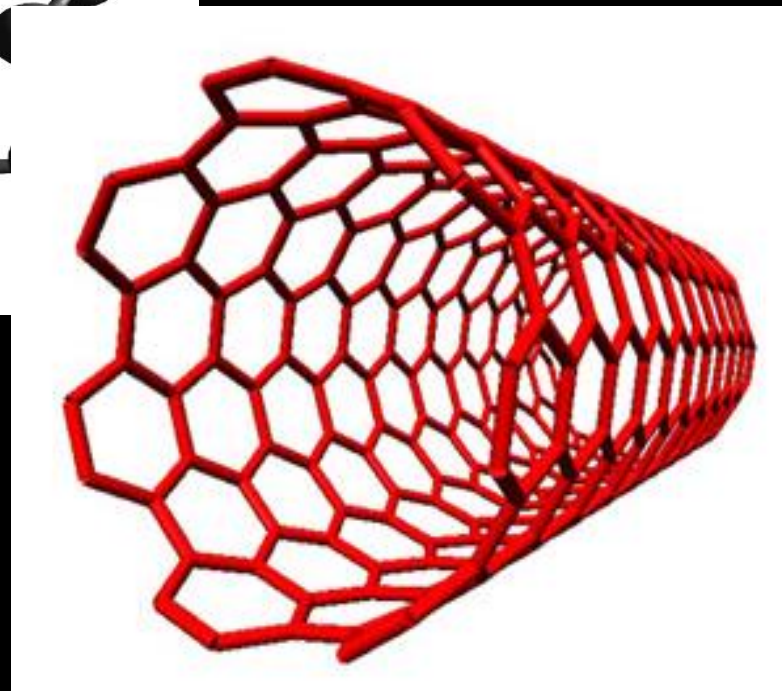


Chemiresistive gas sensing

For chemiresistive gas sensing, where gas molecules are adsorbed in graphene defects.

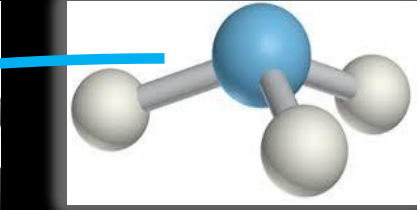
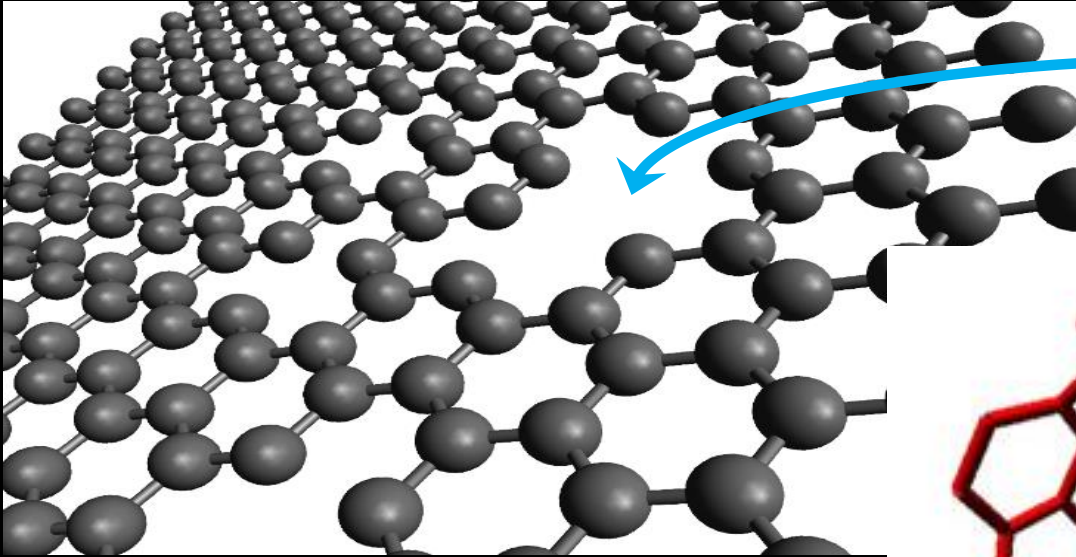


Chemiresistive gas sensing

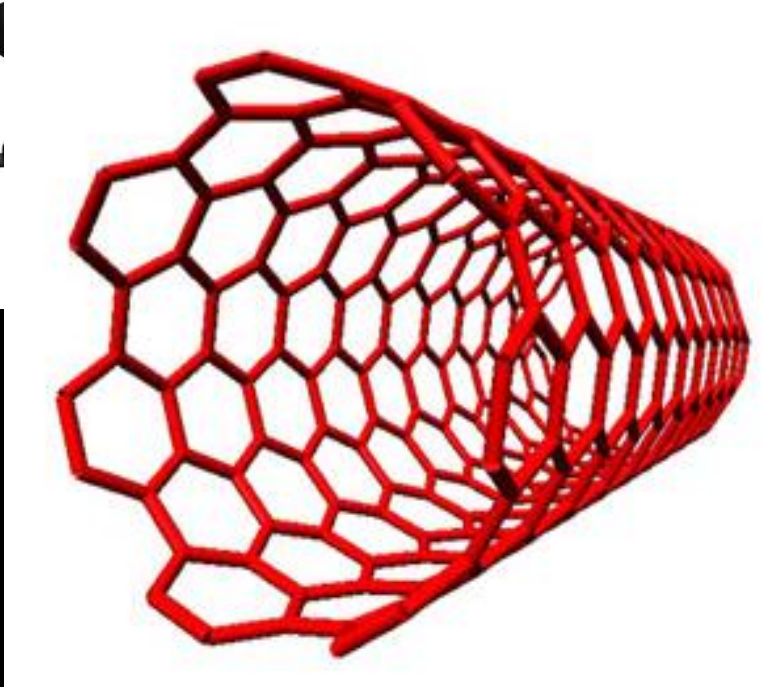


Carbon nanotube electrodes

For electrodes in batteries and electrodes based on carbon nanotubes.

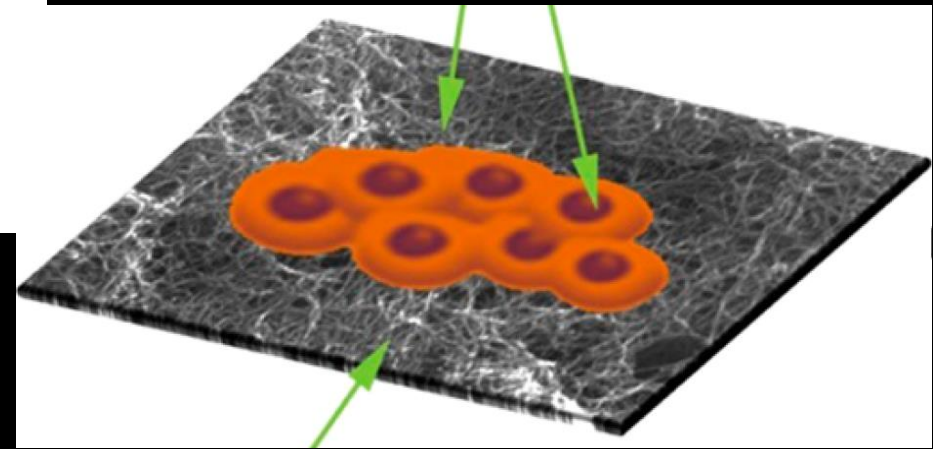


Chemiresistive gas sensing



Carbon nanotube electrodes

Human embryonic stem cells



Carbon nanotube substrate

For stem cell differentiation using carbon nanotube substrates.

Ultra-cold atoms placed close to a surface

can be used as magnetic sensors

to map the active current distribution in the sample.