NANO HIGHLIGHT
Imaging Disorder inside Semiconductors

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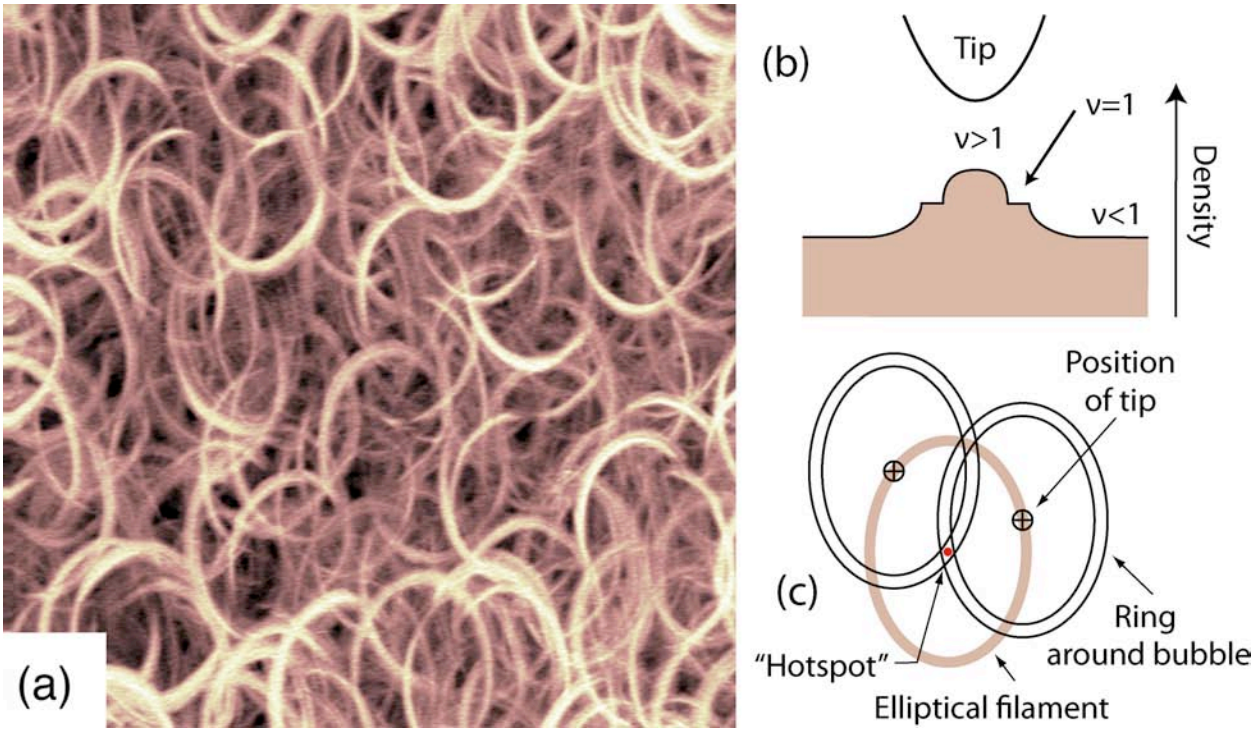

In normal metals electrons travel only very short distances, on the order of tenths of nanometers, before they are scattered. In contrast, in specially engineered semiconductor materials disorder can be reduced to an exceptionally low level, allowing electrons to travel distances a million times longer, up to nearly a millimeter, before scattering. Despite this remarkable achievement, the influence of disorder in these materials is very important and not well understood. **Ashoori** and his research group recently developed a new type of microscopy that can image, with high spatial resolution, structure inside these semiconductor materials. A sharp metallic tip connected to a charge sensor and scanned close to the semiconductor surface detects the motion of electrons inside these materials. The image (a) shows a collection of bright arcs on a dark background over the 9 x 9 μm^2 field of view. A positive voltage applied on the tip forms a bubble of electrons surrounded by an incompressible ring (b). As the tip, and hence the bubble, are scanned across the sample, bright arcs are formed in the image (c). This new microscopy provides the first view of disorder and the quantum behavior of electrons in these semiconductor nanoscale systems.

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