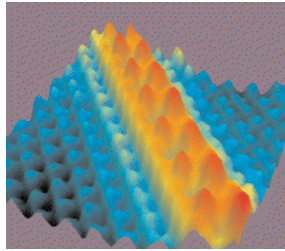


1 - Imaging - Images

• Images of atoms like this one are constructed from data. They cannot be seen in visible light.



• Data for an image can be processed; **noise reduction**, **smoothing** and **edge detection** are all examples of **image processing**.

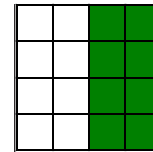
Keywords
Image
Atoms
Noise reduction
Smoothing
Edge detection
Image processing

1.09

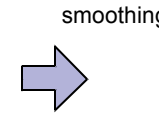
1 - Imaging - Smoothing

• **Smoothing**: sharp edges can be achieved by replacing the **byte** from a **pixel** with the mean of its value and its neighbours.

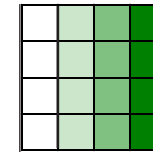
Smoothing



sharp edge



replace each pixel by mean of neighbours and itself



blurred edge

Keywords
Smoothing
Byte
Pixel
Image processing
Mean

1.10

1 - Imaging - STM

- The electron cloud of metal atoms at a surface extends a very small distance above the surface.
- If a needle which has a single atom projecting from its end is brought close to the surface there is a strong interaction between the electron cloud on the surface and that of the tip atom.
- An electric tunneling current then passes when a small voltage is applied.
- At a separation of a few atomic diameters, the tunneling current rapidly increases as the distance between the tip and the surface decreases.
- This change of tunneling current with distance results in atomic resolution if the tip is scanned over the surface to produce an image.

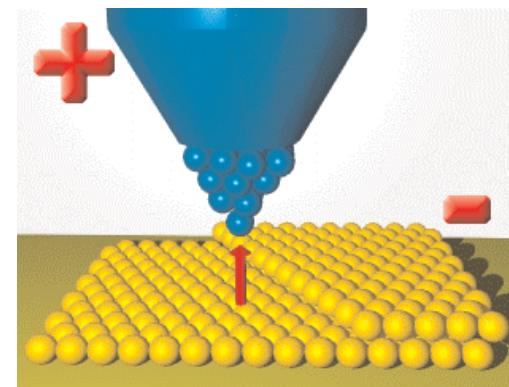
Keywords
Scanning
Tunnelling
Microscope
STM
Resolution
Current

1.12

1 - Imaging - STM

• STM stands for Scanning Tunnelling Microscope.

An STM gives atomic resolution images.



Keywords
Scanning
Tunnelling
Microscope
STM
Resolution

1.11