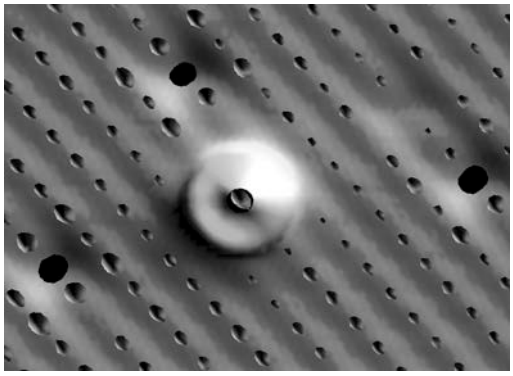
Note: This resource can be downloaded as part of a collection of activities exploring atoms and nanochemistry (https://rsc.li/37302Bh) or for use with a lesson plan on atomic imaging for 16–18 year olds (https://rsc.li/2ZNUGWq).

Name:..... **Date:**.....

Seeing atoms

Pictures

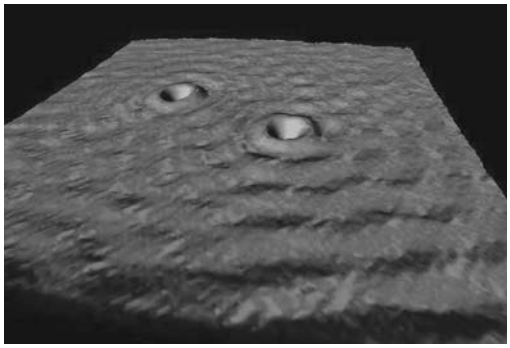
Picture 1: The zit



This picture is made from two images laid one on top of the other. This can be done using a computer. The lower picture is of nickel atoms. The big bump is a xenon atom. The tip of the 'zit' is a peek through to the nickel atom underneath. In a coloured picture produced by a computer, nickel is orange and xenon is blue.

The zit

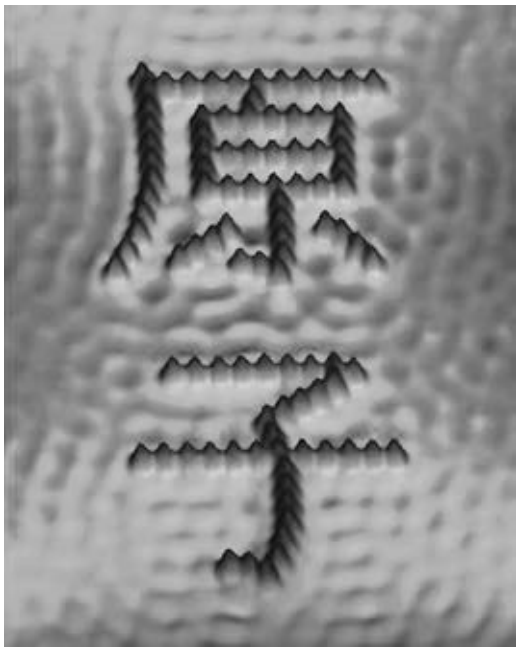
Picture 2: The dents



This is a sample of copper which is not perfect – the two dents are probably caused by atoms of another chemical element. The 'foreign' atoms have electron arrangements which are not the same as those of the copper atoms. The copper electrons on the surface are scattered, making patterns.

The dents

Picture 3: An ‘original child’



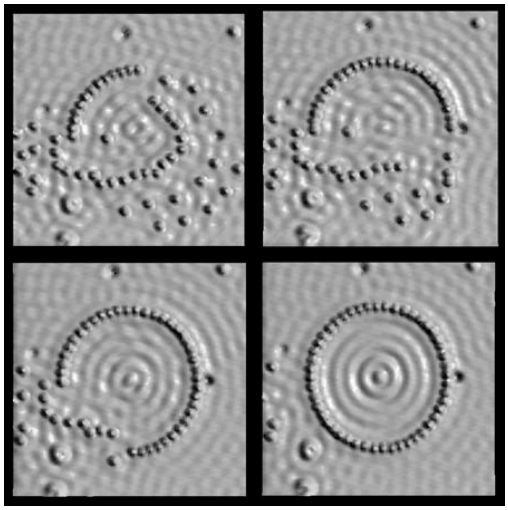
Iron atoms have been arranged on a surface of copper to make two Kanji characters in which together mean ‘atom’. On their own, the characters mean ’original’ and ‘child’ in Japanese and Chinese, giving the title for the picture.

This is how to pronounce the characters:

yuan zi ('you-an zee')	Mandarin Chinese
gen shi ('hard' g, like in 'gun')	Japanese
yuen ji ('you-en jee')	Cantonese Chinese

An 'original child'

Picture 4: Ironing the perfect circle



Ironing the prefect circle

The four pictures show 48 iron atoms being moved into a circle 7.13 nm in diameter on the surface of copper. The tip of an STM is used to move the atoms. The finished ring looks like a birthday cake with candles. A pattern is seen in the centre of the finished ring.