



## Activity 2 – Instrumentation

As nanoscience or nanotechnology can't be seen with the naked eye, specific tools are used to be able to look at science on this scale. Examples of this are the AFM (Atomic Force Microscopy) and the SEM (Scanning Electron Microscope).

### AFM (Atomic Force Microscopy)

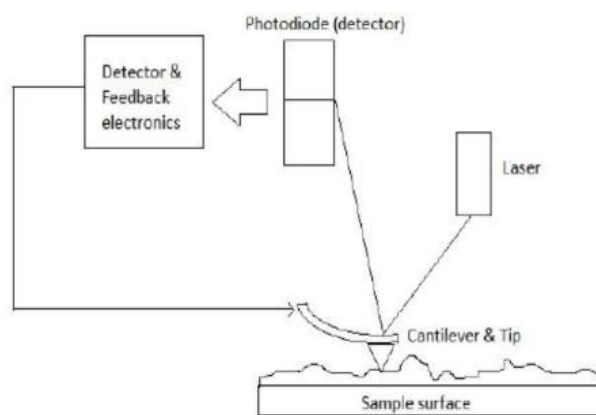


Figure 1

Figure 1 shows how the AFM works. A laser is reflected off the back of the cantilever, which scans the surface. The image is formed from the cantilever, which experiences forces from the surface. From this, a 3D image of the topography of the sample surface can be formed.<sup>1</sup>

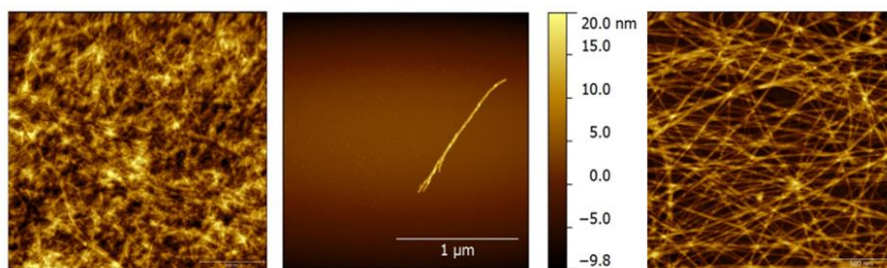


Figure 2

Figure 2 shows fibrils of a peptide called glucagon, which is used to regulate blood sugar in the body. The fibrils are very small, around 12 nm in length.

<sup>1</sup> Ferrari, L.; Kaufmann, J.; Winnefeld, F.; Plank, J. (Jul 2010). "Interaction of cement model systems with superplasticizers investigated by atomic force microscopy, zeta potential, and adsorption measurements". *J Colloid Interface Sci.* 347 (1): 15–24



## SEM (Scanning Electron Microscopy)

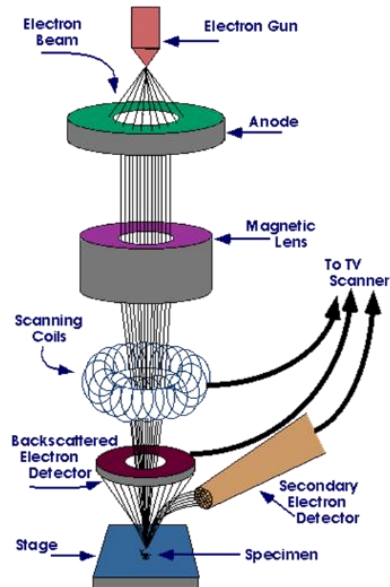


Figure 3

The SEM scans a focused electron beam over a surface to create an image. The electrons in the beam interact with the sample, producing various signals that can be used to obtain information about the surface topography and composition.<sup>2,3</sup>

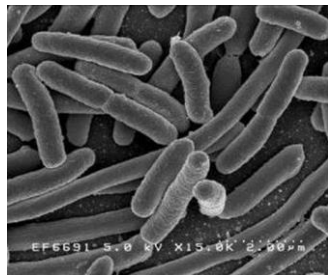


Figure 4

Can you think of any other techniques that might be used to look at the nanoscale? If so, draw a diagram and write a small explanation (100 words) on how the technique works.

<sup>2</sup> Purdue University, SEM, <https://www.purdue.edu/ehps/rem/laboratory/equipment%20safety/Research%20Equipment/sem.html>, Accessed 25/11/2016.

<sup>3</sup> ExplainThatStuff, E. Coli under SEM, <https://www.explainsomething.com/electronmicroscopes.html>, Accessed 25/11/2016.