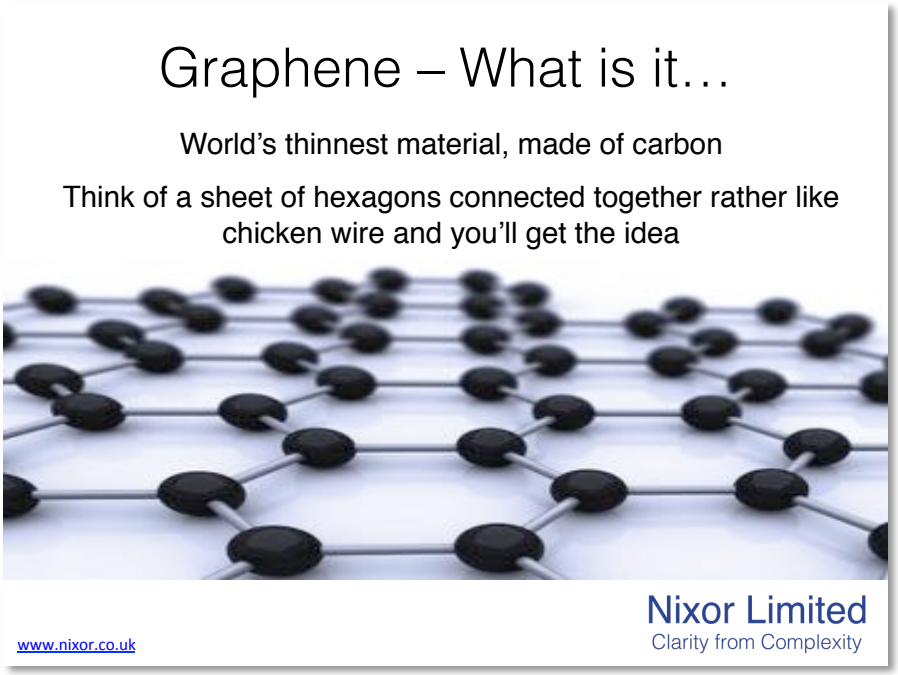
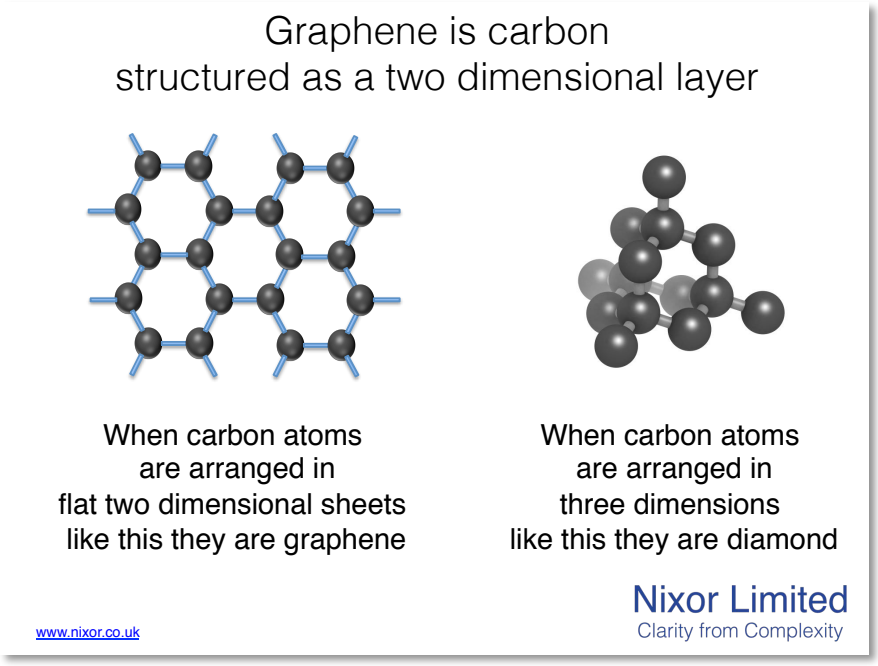
Understanding Graphene Part 1:
What is Graphene?

Graphene is carbon. There, that's the short version, if you'd like to know more read on…

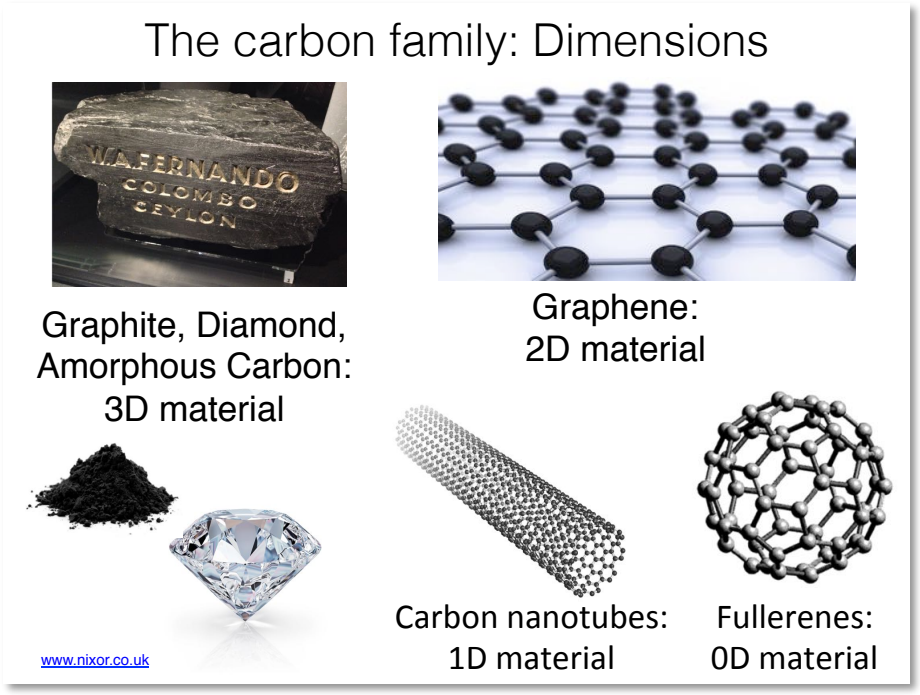


In graphene the carbon atoms are arranged in flat hexagons rather like chicken wire. This creates flat sheets that are actually very stable.



Arrange the carbon atoms in a different way, such as a three dimensional crystal and you get diamond.

There are many other forms of carbon (allotropes) that have been classed in terms of their dimensionality. Dimensions in this context refer to the freedom the structure has to grow in different dimensions.



Three dimension (3D)

When the carbon atoms are arranged in a pattern that can grow in any direction (up – down, left – right, front - back) this is a three dimensional material. When they form a regular crystal they make diamond, when they are arranged less regularly they form amorphous carbon)

Two Dimension (2D)

The flat sheet of graphene can only grow in the left – right or front – back directions. In principle the flat sheet can be as large as you like, but only ever one atom thick so it is said to be two-dimensional.

One Dimension (1D)

When the carbon atoms roll up into a tube they can only grow from either end so they are classed as a one-dimensional material. These are called carbon nanotubes

Zero Dimension (0D)

Carbon atoms can curl up to form ball like structures called fullerenes. As they cannot grow further in any dimension they are termed zero dimensional

So, to summarise, graphene is an allotrope of carbon. Arranged in a flat sheet. It is the world's first two-dimensional material