Graphene's first commercial use will be in flexible touchscreens

Indium tin oxide a goner

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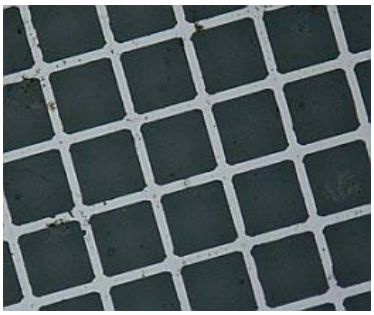

With the rapid advances made in that wonder material graphene, what we want to know is when we will see it in widespread commercial use for the first time.

It seems that the front runner for the first wide adoption could be in transparent flexible touchscreens. A team of researchers has made further steps towards this with the development of a hybrid graphene film.

The research team, headed up by James Tour, wants to replace indium tin oxide (ITO) which is used in most flat panel displays, meaning smartphones, tablets, solar cells and more.

Graphene offers advantages over ITO, a brittle material - as anyone who has dropped their cracked their screens can agree.

Graphene is significantly more flexible, and could form the basis for wearable, transparent computers.

In economic terms, indium is increasingly in demand, meaning that the price of the rare material has grown over the years.

But the team at Rice University has combined a single-layer sheet of graphene with a grid of metal nanowires to create a material that it claims is vastly superior to ITO.

While there is other work into pure graphene, Tour believes that there are problems with transparency and conductivity which are resolved through the use of nano-scale aluminium wires.

The five micron-wide wires, about a tenth the size of a human hair, would have no effect on transparency to the human eye.

The researchers believe that the existing production techniques such - as roll to roll - could be used to produce the technology, leading to claims by paper author Yu Zhu that the material is ready to scale right now.

They've found that after a fall in the material's conductivity, after a small number of uses it begins to stabilise. On a more long term usage basis the material was found extremely resistant.

This means the material can potentially be bent thousands of times without damage.

So, will this be the first commercial application of Manchester University's Nobel prize-winning graphene? Tour seems to think so, claiming touchscreens are likely to be the first "killer app" to bring graphene to the masses.

TechEye spoke to Dr Andrea C Ferrari, a nanotechnology expert in Cambridge University's Engineering department, who shares Tour's belief.

"I do believe that, as things stand at the moment, touchscreens will be the first use of graphene in commercial terms," he told us.

"Graphene has many properties that make it perfect for use as a touch screen as it is much more flexible than, say, indium tin oxide. In many ways it is almost a perfect material.

"Firms such as Samsung and Nokia are also well aware of this and there is a lot of research into developing graphene for touchscreens in smartphones at this time.

"Of course developments with graphene are occurring at an incredibly rapid pace, so it is impossible to say what will happen in the future. For example, graphene is also being looked at for use in batteries. Or there could be a more niche use of graphene that sees commercial release before the touchscreens hit the market."

Indeed, no one knows what is around the corner - and another super-material could pop-up and blow even graphene away, as Ferrari points out.

However, he warns that before we get too excited we may have to wait a while before we actually get our hands on products ready for the market.

"All the physics is understood," he says, "it is just bringing it to a commercially ready version that will take some time. In principle we know we can get mass production, but it will require investment to bring the price of everything down.

"So we could expect the touchscreens in two to three years," Ferrari says, "insofar as they are fully

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developed and functioning models, more complete than working prototypes that are being built now."

A change in thinking is what will really propel the use of graphene in commercial products, Ferrari suggests: "It used to be that people wanted computers that were faster, but this has changed. Developments are looking at making computers that are more compatible with us.

"This means that we will be able to produce computers that can easily be folded up and tucked away. With many smartphones not having big enough screens, you could roll out a larger screen from something in your pocket.

"Or you could have a computer sown into the material of your clothes.

"These are just some of the millions of potential uses of graphene as a touchscreen technology."

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