Polish team claims leap for wonder material graphene

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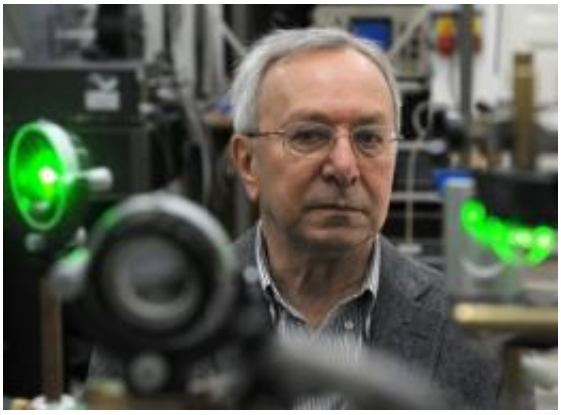

Professor Jacek Baranowski of the Institute of Electronic Materials Technology (ITME) in Warsaw poses on April 7, near a laser in the Polish capital. Baranowski 's team says it has discovered a new method to produce entire layers of graphene, a move that should help to propel it out of the lab and into everyday life.

It's billed as the wonder material of the 21st century with the power to revolutionise micro-electronics, and won its pioneers the 2010 Nobel Physics Prize.

Now Polish scientists say they have discovered a new method to produce entire layers of graphene, a move that should help to propel it out of the lab and into everyday life.

Just one atom thick, the novel form of carbon is the world's thinnest and strongest nano-material, almost transparent and able to conduct electricity and heat.

"This is an important step forward on the path to the production of transistors and then integrated circuits made of graphene," Professor Jacek Baranowski of the Institute of Electronic Materials Technology (ITME) in Warsaw told AFP.

Russian-born, British-based researchers Andre Geim and Konstantin Novoselov were honoured with a Nobel last October for their pioneering work.

Graphene transistors would in theory be able to run at faster speeds and cope with higher temperatures than today's classic silicon computer chips.

That would resolve a fast-growing problem facing chip engineers who want to boost power and shrink semiconductor size but without raising temperatures, the bugbear of computing.

Graphene's transparency also means it could potentially be used in touch screens and even solar cells, and when mixed with plastics would provide light but super-strong composite materials for next-generation satellites, planes and cars.

Electrons can travel relatively huge distances through graphene -- a thousandth of a millimetre is a lot in their world -- without being hampered by impurities which are a problem in the silicon used in 95 percent of electronic devices.

They also pick up speeds of 1,000 kilometres (620 miles) per second in graphene, some 30 times faster than in silicon.

Graphene is also 200 times tougher than steel.

But the catch so far has been a lack of methods to turn out layers of it, and that is where the work of Baranowski's research team come in.

"The new method is based on using the technique of epitaxy on silicon carbide in a gaseous, pressurised environment," said Baranowski, who also works at the University of Warsaw's experimental physics faculty.

Epitaxy is a technique for growing a micro-thin, honeycomb-shaped lattice of the desired material.

While it is currently possible to produce graphene layers, relatively large ones can only be made on a metal base. That hampers graphene's electronics potential.

Without such a base, current techniques only allow for a maximum layer surface of four square inches (25 square centimetres).

Current methods also fail to produce graphene as uniform as that devised by Baranowski's team, he said.

It is precisely that uniformity that would make graphene more readily usable in the hi-tech sector, he added.

The team's discovery was announced in the most recent edition of the US scientific periodical Nano Letters. It is set to be presented at a conference starting Monday in Bilbao, Spain.

ITME's research was carried out under the wing of the European Science Foundation, which groups 78 organisations in 30 nations.

It is part of a wider project aimed at producing a graphene transistor,

along with researchers in the Czech Republic, France, Germany, Sweden and Turkey.

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