Russians Win Physics Nobel Prize for Graphene Material

By Naomi Kresge - Oct 5, 2010 4:42 PM GMT

Two Russian-born scientists won the Nobel Prize in Physics for discovering graphene, a one-atom-thick “wonder material” that may transform electronics, allowing for speedier computers and folding touchscreens.

Andre Geim, 51, now a Dutch citizen, and Konstantin Novoselov, 36, both professors at the University of Manchester in the U.K., will share the 10 million-Swedish kronor ($1.5 million) prize, the Royal Swedish Academy of Sciences said today in Stockholm.

Samsung Electronics Co. and IBM Corp. are among the companies working with the material, the thinnest and strongest substance ever discovered. Nearly transparent yet dense, graphene conducts heat and electricity, giving it potential uses in light panels and computers, the academy said in a statement.

In a “Friday afternoon experiment just for fun,” Geim and Novoselov transcended what other physicists thought was possible by producing the first two-dimensional material, Andrea Ferrari, head of the nanomaterials and spectroscopy group at the University of Cambridge, said in a telephone interview.

“This material is simple, it is easy to make, and it has properties far surpassing most other materials,” he said.

Geim and Novoselov used Scotch tape to obtain a layer of carbon just one atom thick from a piece of graphite, the substance found in pencils. Students still use the “Scotch tape method” to obtain tiny flakes of graphene for research projects, Ferrari said.

Satellites and Cars

“I didn’t expect the Nobel Prize this year,” Geim said by telephone to a press conference in Stockholm. He said he planned to go back to work today. “I just try to muddle on as before.”

Graphene was “hailed as a wonder material when the discovery was made,” said Joseph Winters, a spokesman for the London-based Institute of Physics. The material is ideal for uses in satellites and aircraft technology, he said.

Satellites, airplanes and cars could be made out of plastics mixed with graphene, the Nobel academy said.

Touchscreens are “a good candidate” to be the first consumer technology to use graphene, according to Ferrari. Samsung developed a process to mass-produce graphene in 30-inch
Ferrari said he began collaborating with Nokia Corp. last week to integrate graphene into a mobile phone.

Corporate Interest

Samsung is experimenting with graphene at the Samsung Advanced Institute of Technology in Kiheung, South Korea. IBM researchers demonstrated the world's fastest graphene transistor in a paper in the journal Science in February. Nokia is looking at several potential applications of graphene in mobile communications, according to spokesman Mark Durrant.

"We're quite excited about this material but it's not a technology yet," said Supratik Guha, director of physical sciences at Armonk, New York-based IBM, which has worked with graphene for five years. "There is still a lot of work to be done." IBM's program on radio-frequency transistors is funded by the U.S. Department of Defense.

Geim declined to predict which application of graphene might be the most important. "There are so many," he said.

Novoselov is a Russian and British citizen. He began working with Geim as a PhD student in the Netherlands, then followed the older scientist to the U.K., according to the academy's statement.

Levitating Frog

Last year's physics prize went to Charles K. Kao of the Chinese University in Hong Kong and Willard S. Boyle and George E. Smith of Bell Laboratories in Murray Hill, New Jersey, for their work on fiber optics and digital imaging.

Annual prizes for achievements in physics, chemistry, medicine, peace and literature were established in the will of Alfred Nobel, the Swedish inventor of dynamite, who died in 1896. In 1901 the first Nobel Prize in Physics was awarded to Wilhelm Roentgen for his discovery of X-rays.

Geim said he was proud to be, as far as he knew, the only scientist to win both a Nobel and an Ig Nobel, an award given at Harvard University for "achievements that first make people laugh, and then make them think," according to the prize's website. He and Michael Berry of the University of Bristol shared the 2000 physics award for using magnets to levitate a frog.

"It takes some courage to accept" an Ig Nobel, Geim said. "Having both, I think it will help people to promote a sense of humor in the scientific community."