Nobel laureate for physics to join NUS

Co-creator of graphene is first Nobel winner to join a S’pore varsity

Chang Ai-Lien
Science Editor

In a first for Singapore, a Nobel Prize winner is joining a university here.
Professor Konstantin Novoselov, 44, is part of the duo behind the revolutionary supermaterial graphene. He started work at the National University of Singapore (NUS) on Monday as distinguished professor of materials science and engineering.
“I have had a long relationship with Singapore and worked intensely with NUS for many years,” said Prof Novoselov, who started collaborating with local scientists about a decade ago, and has been an international scientific adviser to the NUS Centre for Advanced 2D Materials since 2015.
He told The Straits Times that he decided to move here because of the strong research base in physics and materials science as well as the “flexible, dynamic government” which has made research a key focus.
“I also wanted a fresh start, to get more inspiration and ideas,” added Prof Novoselov, who holds British and Russian citizenship.
“The potential of Singapore is far greater than people can imagine.”
Prof Novoselov, or “Kostiya”, as he is known, and Professor Andre Geim were awarded the Nobel Prize for Physics in 2010 for their ground-breaking achievements with graphene.
A mere one-atom thick, graphene is the first two-dimensional material ever discovered, and superbly conductive, stretchable and strong.
It is considered by many as one of the most exciting materials in technological research, with a wide range of potential uses in fields as varied as consumer technology and environmental science. For instance, it is being tested in desalination filters that produce clean drinking water, batteries, next-generation LED bulbs and solar cells.
In Singapore, Prof Novoselov plans to work on synthetic materials that do not currently exist.
Rather than designing products which are limited by the properties of the materials they are created from – such as the brittleness of glass, for instance – he wants to turn that idea on its head.
“Instead, we are talking about designer materials with pre-determined properties that we need,” he explained.
This could range from artificial skin which can heal itself or control humidity, to a neuromorphic computing system which can learn and perform a task on its own by interacting with its surroundings.
“I am fascinated by the idea of creating and exploring the properties of novel materials,” he said.
Said Professor Tan Eng Chye, who is NUS president: “We are thrilled that Kostiya is joining NUS and that he will contribute to the scientific community at NUS and in Singapore.
“This is a reflection of the vibrancy of the Singapore research community and a resounding recognition of the high quality of research applications produced by our faculty.”
Professor Ho Teck Hua, NUS senior deputy president and provost, added: “We hope that many of our young Singaporean researchers will be inspired by his commitment to research excellence and his drive to create new materials and develop novel applications for them.
“Our researchers will benefit greatly from having the opportunity to collaborate with Kostiya and his lab on exciting research opportunities.”
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Be bold, says Nobel laureate joining NUS

Co-creator of supermaterial graphene wants to infuse others with his passion for science

Billions of dollars are being poured into graphene research by institutes and companies worldwide. But long before it became a hot field, scientists in Singapore were already shouting in excitement.

In fact, the Graphene Research Centre at the National University of Singapore (NUS) has operated a $35 million Centre for Advanced 2-Dimensional Materials since 2008.

NUS says that one of its research strengths is materials science, where scientists focus on studying nanomaterials such as graphene, as well as developing new materials for use in sustainable energy, environmental engineering, telecommunications technology and medical technology.

In 2011, the university’s materials scientists produced its 5,000th publication and were ranked 37th in the world in terms of their research impact.

NUS then doubled down on its materials science strategy by adding a super-materials research focus, which would allow for the development of graphene and other materials with unique properties.

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When Professor Konstantin Novoselov tells a talk, he never makes any mention of the Nobel Prize in Physics that he was awarded in 2004, when he was just 36.

Yes, the top award is special, he admits, but the man behind the supermaterial graphene does not really think much about it.

In Singapore, where he stays work week next week, he says his job is “to make a kind of communication between the researchers and the students, and then all the students and colleagues who come from all over the world.”

His is a busy schedule that includes some 20-30 meetings on the lecture circuit and collaborations with whom he plans to meet closely to school students, to show them how they can create something totally new from nothing.

He is also looking for a fresh start and, with it, new inspiration and ideas.

“People who look at me assume that I am an extremely exciting researcher, but I would like to expand to developing new materials,” he says.

His talk will focus on the topic of “designing materials that do not exist in nature, which have predetermined properties,”

“By the example of human skin, we can put the number of possible materials that we can create,” he says.

“Imagine if we can create artificial skin, which can control our body temperature, or perform functions.”

“This is not as far fetched as it sounds, the scientists, who specializes in condensed matter physics, which looks at the visible and microscopic properties of matter, mesoscopic physics (dealing with materials at an entum of quantum phenomena) and nanotechnology (where material properties are determined at an atomic or molecular level),

“What I learn from my course is that there are so many different possibilities, new degrees that have been found in the world,”

And he fellow researcher Andre Geim tells it to be fame when they were awarded the Nobel Prize for their groundbreaking achievements in graphene.

Made up of a single layer of carbon atoms, it is the thinnest material discovered to date, but it is hundred of times stronger than steel.

PROFESSOR KONSTANTIN NOVOSLOV

Where art and science mix

Beyond his highly noted work in physics, Professor Konstantin Novoselov is also an artist who trained in traditional Chinese painting in China.

Science and art are two corners of one, he notes, as both professions call for improvisation, a willingness to take risks and be open to new ideas, as well as the ability to think outside the box.

He says the collaborative approach in traditional Chinese art lies nicely with his physics back- ground.

The search for a minimal solution—the most basic foundation of ink on the paper that is able to create a particular mood—is very similar to his work as a non- experimental physicist, where his aim is to pick, highlight and simplify the effect of interest.

“The aim, in fact, is to use a brush and brush strokes to convey an idea,” he explains.

In fact, he has even painted his own version of graphene, ink is its paintings.

It not only produces more shadows of gray, but also allows for more nuanced inferences.

He often collaborates with other artists on installations and exhibitions.

“The most exciting breakthroughs are often created at the crossroads between disciplines,” he says.

“The same is applied to art as well, when new media and new techniques can result in very exciting developments.

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In this painting, chalk, dyes on rice paper with Chinese and graphene ink. Professor Konstantin Novoselov says just as a few brush strokes to the determined, slow and fast nodes of the chalk.