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СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
КАФЕДРА ІНОЗЕМНИХ МОВ
ЛІНГВІСТИЧНИЙ НАВЧАЛЬНО-МЕТОДИЧНИЙ ЦЕНТР

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НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ
ЛІНГВІСТИЧНОГО НАВЧАЛЬНО-МЕТОДИЧНОГО ЦЕНТРУ
КАФЕДРИ ІНОЗЕМНИХ МОВ

“TO MAKE THE WORLD SMARTER AND SAFER”

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GRAPHENE MAKES OUR LIFE EASIER

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Graphene is one of the most perspective modern materials. Graphene is an atomic-scale honeycomb lattice made of carbon atoms and discovered only a few decades ago.

How can we get it? There are two methods: mechanical and chemical. Technically, we can make graphene by sticking a piece of tape onto the “lead” of a graphite pencil and then peeling the tape off. Graphene is not particularly useful in that form, however. Researchers want to make large sheets of graphene, which could then go next-generation electronics.

How can we use it? Potential graphene applications include lightweight, thin, flexible, yet durable display screens, electric circuits, and solar cells, contaminant removals, water filters, waterproof materials, various medical, chemical and industrial processes enhanced or enabled by the use of new graphene materials and many others.

Graphene sheets perforated by small holes have first been explored by researchers at MIT as potential candidates for water filtration. Holes with a diameter of 1 nanometre are big enough to let water molecules sift through, however small enough to stop any undesired chemicals.

Pacific Northwest National Laboratory scientists are getting prepared to test graphene-enhanced lithium ion batteries that can charge your cell phone and power tools in minutes, not hours.

Nobody has made night-vision contact lenses yet but here's a glimpse at how that technology might work, if it ever comes to be. University researchers have invented new graphene-based material that detects and emit a stronger infrared light. Graphene sensors have two advantages compared with the standard. The first one is that the optical sensors based on graphene require ten times less energy for work. The second advantage of graphene sensors is that they are 1,000 times more sensitive.

Graphene can be used as a very sensitive sensor detecting individual molecules in the air. The scheme of this sensor is that different molecules can be donors and acceptors, which changes resistance of graphene.

In May 2013 the creation of solar paint comprising graphene was announced. It absorbs energy from sunlight and transforms it into electricity. Solar paint was developed by scientists at the University of Manchester in cooperation with specialists from the National University of Singapore. It can cover the walls of houses and office buildings to generate electricity.

Could you imagine a bulletproof vest with graphene? Not so easy to check the strength of the thin material through direct shots. Scientists from the University of Massachusetts have developed a miniature ballistic test to check the stability of graphene. It showed that graphene is in two times better than Kevlar.

If equipped 300-seat Boeing 777 airliner with ultralight aerogels graphene-based parachutes, its weight would increase only by 60 kilograms. Scientists estimate that a ready device will weigh lighter than shirt. The porous material, created by a team of researchers led by Professor Gao Chao from Zhejiang University in China, consists of dried carbon oxide and graphene. Today, graphene aerogel is the lightest solid material in the world.

On the other hand, we have health risks. Research at Brown University found out that graphene flakes are able to pierce cell membranes in solution. They were observed to initially enter via sharp and jagged points, allowing graphene to be internalized in the cell. The physiological effects of this remain uncertain, and this remains a relatively unexplored field.

Every epoch has its own greatest discovery, which sets the pace and direction of progress many years ahead. For example, the metallurgy was the basis of the industrial revolution; invention of semiconductor transistor in the XX century made it possible the emergence of the modern computerized world. Will graphene be this miracle material of the XXI century and will we create graphene-based devices, which we now can't even imagine? It may well be. Moreover, recently, Samsung announced that its scientists have discovered an inexpensive way for mass production of graphene.