IRISH RESEARCHERS IN WORLD FIRST DISCOVERY THAT COULD VASTLY IMPROVE AIR AND WATER QUALITY TESTING

New graphene sensors could have use in air conditioning systems and water treatment plants

Dublin, 7 May – Researchers at CRANN, Ireland's leading nanoscience institute, funded by Science Foundation Ireland and based at Trinity College Dublin (TCD), have discovered a new concept in sensor-development. The research provides a completely new platform for the development of sensors worldwide and will lead to low-energy, remotely powered sensors that have greater detection capacity than those currently available.

Sensors receive and respond to signals when touched – either by physical or chemical matter. Everyday uses of sensors include in thermometers, medical devices such as pacemakers, in smoke alarms and intruder alarms, as well as in heat and air conditioning systems.

Prof. Georg Duesberg and his colleagues at CRANN and TCD's School of Chemistry have manufactured a graphene diode sensor, composed of a single layer of graphene on a silicon surface. Graphene is a material with extraordinary properties that mean its use in sensors can detect even the slightest change in signal. It is a one-atom thick sheet of carbon, which is 200 times stronger than steel, but is incredibly conductive and extremely light.

This new concept in sensor development will have commercial application in air quality control systems, particularly important in car manufacturing where the quality of the air is reduced through smog, exhaust fumes, odours and dust. The new air conditioning systems will react to the quality of the air – and adjust accordingly.

It could also lead to improved detection of bacteria and parasites such as cryptosporidium in drinking water supplies. In medicine, it could lead to the identification of bacteria in a patient's exhaled air, meaning quicker, more accurate diagnosis of certain diseases.

Dr. Diarmuid O'Brien, Executive Director at CRANN said, "*Everyday, CRANN researchers are discovering new concepts that have applications across a range of industries from medicine, to energy, pharmaceuticals and electronics among others. Nanoscience is leading to the products of the future, and CRANN's researchers are having real impact helping to attract some of the world's leading manufacturing companies to our shores. The discovery by Georg and his colleagues has already received interest from some leading car manufacturers and I look forward to seeing him bring his research to commercial application.*"

Prof Georg Duesberg said, "*This discovery is one of the most exciting in sensor-development to date. It could lead to sensors that are much more functionally advanced, cost effective and energy efficient than those currently available and could vastly improve the monitoring of air and water quality.*"

Prof Georg Duesberg is one of CRANN's 19 Principal Investigators. He specialises in fabricating carbon nanostructures, such as graphene and nanotubes for applications in ICT and renewable energy. Prof Duesberg is one of the Irish researchers involved in the Graphene Flagship, an EU project investigating the commercial potential of graphene, worth €1 billion over 10 years.

His paper was recently published in http://pubs.acs.org/doi/full/10.1021/nl400674k

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About CRANN:

The Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN) is Trinity College Dublin's largest research institute and a Science Foundation Ireland (SFI) funded Centre for Science, Engineering and Technology (CSET), which partners with University College Cork (UCC). **Celebrating its 10th Anniversary this year,** CRANN is focused on delivering world leading research and innovation – through extensive proactive collaborations with industry and through commercialisation of intellectual property. Since its foundation, CRANN has obtained €200M of competitive funding from Government, Industry, the European Union and Philanthropy. CRANN is comprised of a team of over 300 researchers, led by 19 Principal Investigators (PIs), each of whom is an internationally recognised expert in their field of research. It is interdisciplinary working in partnership with the Schools of Physics, Chemistry, Pharmacy and Pharmaceutical Science, Medicine and Engineering based at Trinity College Dublin as well as the School of Chemistry at University College Cork. CRANN is also co-host to CCAN, the Collaborative Centre for Applied Nanotechnology which facilitates industry collaboration to develop nano-enabled solutions for Irish-based companies.