Providing a clearer picture of nanotechnology's full potential

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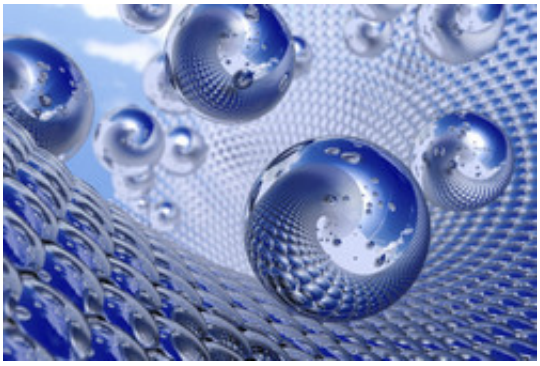

A new tool capable of carrying out simultaneous nano-sized measurements could soon lead to more innovative nanotech-based products and help boost the EU economy. Indeed the tool, developed by scientists cooperating through the EU-funded UNIVSEM project, has the potential to revolutionise research and development in a number of sectors, ranging from electronics and energy to biomedicine and consumer products.

Nanotechnology, which involves the manipulation of matter at the atomic and molecular scale, has led to new materials – such as graphene – and microscopic devices that include new surgical tools and medicines. Up until now however, nanotech R&D has been hampered by the fact that it has not been possible to achieve simultaneous information on 3D

structure, chemical composition and surface properties.

This is what makes the UNIVSEM project, due for completion in March 2015, so innovative. By integrating different sensors capable of measuring these different aspects of nano-sized materials, EU scientists have created a single instrument that enables researchers to work much more efficiently. By providing clearer visual and other sensory information, the tool will help scientists to manipulate nano-sized particles with greater ease and help cut R&D costs for industry.

The project team began in April 2012 by developing a vacuum chamber capable of accommodating the complex sensory tools required. In parallel, they significantly improved the capabilities of each individual analytical technique. This means that users now need just one instrument to achieve key capabilities such as vision and chemical analysis.

Preliminary tests demonstrated that the achieved optical resolution of 360 nanometres (nm) far exceeds the original 500 nm target set out at the start of the project. This should be of significant interest to numerous sectors where cost-efficient but incredibly precise measurements are required, such as in the manufacture of nano-sized surgical tools and nano-medicines.

Electronics is another key area. For example, the UNIVSEM project could help scientists learn more about the properties of quasiparticles such as plasmons. Since plasmons can support much higher frequencies than today's silicon based chips, researchers believe they could be the future for optical connections on next-generation computer chips.

Plasmon research could also lead to the development of new lasers and molecular-imaging systems, and increase solar cell efficiencies due to their interaction with light. Another exciting area of nanotechnology concerns silver nanowires (AgNWs). These nanowires can form a

transparent conductive network, and thus are a promising candidate for solar cell contacts or transparent layers in displays.

The next stage is the commercialisation of the instrument. The multi-modal tool is expected to spur nanotechnology development and enhanced quality control in numerous areas – such as the development of third generation solar cells – and create new opportunities in sectors that have until now not fully tapped into the potential of nanotechnology.

More information: For further information, please visit: www.univsem.eu/

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