Plasma nanoscience needed for green energy revolution

April 14 2011

A step change in research relating to plasma nanoscience is needed for the world to overcome the challenge of sufficient energy creation and storage, says a leading scientist from CSIRO Materials Science and Engineering and the University of Sydney, Australia.

Professor Kostya (Ken) Ostrikov of the Plasma Nanoscience Centre Australia, CSIRO Materials Science and Engineering, has highlighted, in IOP Publishing's *Journal of Physics D: Applied Physics*, the unique potential of plasma nanoscience to control energy and matter at fundamental levels to produce cost-effective, environmentally and human health friendly nanoscale materials for applications in virtually any area of human activity.

Professor Ostrikov is a pioneer in the field of plasma nanoscience, and was awarded the Australian Future Fellowship (2011) of the Australian Research Council, Walter Boas Medal of the Australian Institute of Physics (2010), Pawsey Medal of the Australian Academy of Sciences (2008), and CEO Science Leader Fellowship and Award of CSIRO (2008) on top of gaining seven other prestigious fellowships and eight honorary and visiting professorships in six different countries.

He said: "We can find the best, most suitable plasmas and processes for virtually any application-specific nanomaterials using plasma nanoscience knowledge.

"The terms 'best' and 'most-suitable' have many dimensions including

quality, yield, cost, environment and human friendliness, and most recently, energy efficiency."

Plasma nanoscience involves the use of plasma – an ionised gas at temperatures from just a few to tens of thousands Kelvin – as a tool to create and process very small (nano) materials for use in energy conversion, electronics, IT, health care, and numerous other applications that are critical for a sustainable future.

In particular, Ostrikov points out the ability of plasma to synthesise carbon nanotubes – one of the most exciting materials in modern physics, with extraordinary properties arising from their size, dimension, and structure, capable of revolutionising the way energy is produced, transferred and stored.

Until recently, the unpredictable nature of plasma caused some scientists to question its ability to control energy and matter in order to construct nanomaterials, however Ostrikov draws on existing research to provide evidence that it can be controlled down to fundamental levels leading to cost-effective and environmentally friendly processes.

Compared to existing methods of nanomaterials production, Ostrikov states that plasma can offer a simple, cheaper, faster, and more energy efficient way of moving "from controlled complexity to practical simplicity" and has encouraged researchers to grasp the opportunities that present themselves in this field.

More information: From 14th April this journal paper can be found at iopscience.iop.org/0022-3727/44/17/174003 . This paper is part of the *Journal of Physics D: Applied Physics* special issue entitled "Perspectives in plasma nanoscience" and is available from 14th April at iopscience.iop.org/0022-3727/page/Special%20issue%20collection

Provided by Institute of Physics