

New technology to enable development of 4G solar cells

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Professor Ravi Silva of the University of Surrey's Advanced Technology Institute has identified the range of combinations of organic and inorganic materials that will underpin new 4th generation solar cell technology – opening the door for more efficient, cost-effective and larger scale solar power generation.

Solar power – the greenest form of renewable energy – is in increasing demand across the world, with the global capacity for [solar power generation](#) now topping 100GW.

The new 4G [solar cells](#) defined by Professor Silva are a hybrid that combine the low cost and flexibility of conducting [polymer films](#) (organic materials) with the lifetime stability of novel nanostructures (inorganic materials). This 'inorganics-in-organics' technology improves the harvesting of solar energy and its conversion into electricity, offering better efficiency than the current 3G solar cells while maintaining their low cost base. In turn, these 3G cells offer significant cost improvements on first and second generation solar cells – based on crystalline and [polycrystalline silicon](#) – which are still responsible for over 90% of the solar power being generated today.

Along with a number of notable research institutions, the University of Surrey is part of the European Union FP7 SMARTONICS programme – a €11.6m project led by the Aristotle University of Thessaloniki. This project is currently developing the smart machines, tools and processes for large-scale production of 4G solar cells, using roll-to-roll printing

technology for high throughput and cost-efficient fabrication.

Outlining the new 4G technology in his recent keynote address at the 10th International Conference on Nanoscience and Nanotechnology (NN13) in July, Professor Silva said: "These new generation materials for solar cells have been truly engineered at the nanoscale. They are designed to maximise the harvesting of solar radiation, and thereby efficiently generate electricity."

Speaking to a packed conference hall at NN13 – part of NANOTECHNOLOGY 2013 [www.nanotechnology.com]– he also outlined the significant progress being made by the solar industry in bringing down the cost of solar electricity. In many parts of the world, it now competes with grid electricity in terms of cost, and since it requires less infrastructure, solar power can also be used in areas where conventional electricity is not an option.

Conference Chair Professor Stergios Logothetidis thanked Professor Silva for "introducing the idea and concept of 4G solar cells to the world" and added: "We believe that 4G solar cells will be the technology for future photovoltaic energy sources."

Provided by University of Surrey

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