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A brighter future for solar energy

Researchers at Northumbria University are investigating new sunlight-harnessing materials that could help meet the world's future energy needs.

The research team, led by Dr Ian Forbes, are exploring a thin film photovoltaic (PV) technology based on Copper-Zinc-Tin Sulphide (CZTS) a material with a kesterite – crystal structure – that uses raw materials that are less expensive and more widely available than materials currently used in PV panels.

If found to be effective, CZTS could revolutionise the solar energy market, to enable the capacity of energy produced from sunlight to satisfy the growing

global energy demand.

Northumbria's research is part of a wider €3.7m European KESTCELLS project that aims to train researchers to develop CZTS-based solar cells that would make solar-generated electricity more sustainable and competitive.

Dr Forbes and his colleague Professor Nicola Pearsall will explain their research into Kesterite materials during a session at the British Science Festival this month. Their interactive talk, entitled 'A Brilliant Future: how sunlight will wave goodbye to our fossilised past', emphasises the potential of solar energy to replace the world's dependence on fossil fuels.

Dr Forbes, Reader at Northumbria University, said: "More solar energy falls on the earth's surface in one hour than the entire global population uses in a year. It is important that we increase our capabilities of using the sun as an energy source. In order to do this, research is needed to find the best performing thin film technology that is based on sustainable materials and is capable of being cheaply manufactured, bringing down the price of photovoltaic energy.

"The goal of the KESTCELLS project is to increase our understanding of these new kesterite materials, improve device efficiency and investigate production processes and whether it can be manufactured en masse."

Northumbria University is a member of the KESTCELLS consortium, made up of key European universities, research institutions and companies, tasked with developing PV technologies.

The aim is that PV technologies will become a reliable and future alternative to non-renewable energy sources. To achieve this goal, consortium members are creating a training network of researchers to become experts in the development, design and assessment of thin film PV technologies based on these materials.

Earlier this year Pepe Márquez, a Chemistry graduate from the University of Seville, Spain, joined Northumbria as an early stage researcher under Dr Forbes' supervision.

Pepe, who is studying the effectiveness of kesterites for his PhD, will also

present at the British Science Festival. He said: “Sun energy is going to be here forever and it has the potential to cover all of the energy needs of the planet. We just need to develop the technology to transform the energy into electricity.

“This new kesterite-based technology has great potential in terms of cost effectiveness for the photovoltaic market. We are working with incredibly thin technology – 30 times thinner than a single strand of hair – using a few milligrams of copper, zinc and tin to make the panels cheap and capable of being mass produced.”

Northumbria, the only UK university to be part of the KESTCELLS project, has been a leading name in photovoltaic research for more than two decades, providing expert research and consultancy services for industrial and commercial projects. The University’s Northumberland Building was the first building in the UK to be fitted with a solar panel facade.

The British Science Festival is an annual celebration of science, engineering and technology which visits a different UK city each year. The Festival is organised by the British Science Association and this year is being hosted by Newcastle University with Northumbria University and Newcastle City Council as associate partners and AkzoNobel, Northumbrian Water, GE Oil & Gas and Saudi Aramco as sponsors. The Festival will take place in different venues in and around the city from Saturday 7 September through to Thursday 12 September.

‘A Brilliant Future: how sunlight will wave goodbye to our fossilised past’ takes place on Wednesday 11 September at Newcastle University.

For more information about the session, visit www.britishsciencefestival.org. To find out more about the KESTCELLS project, visit www.kestcells.eu.

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Contacts



Rik Kendall

Press Contact
PR and Media Manager
Business and Law / Arts, Design & Social Sciences
rik.kendall@northumbria.ac.uk
07923 382339



Andrea Slowey

Press Contact
PR and Media Manager
Engineering and Environment / Health and Life Sciences
andrea.slowey@northumbria.ac.uk
07708 509436



Rachael Barwick

Press Contact
PR and Media Manager
rachael.barwick@northumbria.ac.uk
07377422415



James Fox

Press Contact
Student Communications Manager
james2.fox@northumbria.ac.uk



Kelly Elliott

Press Contact
PR and Media Officer
kelly2.elliott@northumbria.ac.uk



Gemma Brown

Press Contact
PR and Media Officer
gemma6.brown@northumbria.ac.uk