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Bright future for British solar

Carbon Trust and the University of Cambridge secure international investment
into new UK solar company

14 September 2010



Cambridge Enterprise, the University of Cambridge's commercialisation office, and the Carbon Trust today announced the launch of Eight19 Limited, a new solar energy company which will develop and manufacture high performance, lower cost plastic solar cells for high-growth volume markets.

Spun-out from the Carbon Trust's Cambridge University-TTP Advanced Photovoltaic Research Accelerator, this latest commercial phase will focus efforts on developing product prototypes, backed by a £4.5m investment from the Carbon Trust and leading international specialty chemicals company Rhodia.

Eight19, so called as it takes 8 minutes and 19 seconds for light to travel from the sun to the earth, has been created in partnership with Professor Sir Richard Friend, Professor Henning Sirringhaus and Professor Neil Greenham of Cambridge's internationally renowned Cavendish Laboratory, and technology development company TTP.

With improvements in efficiency and lifetime, breakthroughs in organic photovoltaic technology could provide solar power at a price substantially lower than that offered by 1st and 2nd generation technologies for certain applications, which could open up new markets for solar.

Eight19's focus on the low cost potential of solar cells made with semiconducting plastics (also known as organic photovoltaics, or OPV) is built on the Cavendish Laboratory's capability to develop techniques for fabricating large scale plastic electronic devices on flexible materials using roll-to-roll processes. The company will continue to be actively engaged with the Cavendish and its innovative research output.

The market for organic solar cells has the potential to reach \$500 million by 2015 and to grow four fold to \$2 billion by 2020 (Nanomarkets, 2009) driven by applications such as building-integrated photovoltaics, and could save up to 900 million tonnes of CO₂ by 2050 – some 1.5 times the UK's current annual emissions.

The Eight19 team is pursuing a design-for-manufacture strategy that focuses on the unique attributes of organic photovoltaics, combining both specific product performance characteristics and low cost of energy.

Unlike other more familiar thin film solar platforms, organic solar cells are not inherently limited by constraints around material supply and toxicity, and benefit from a number of fundamental advantages including potentially very low cost production enabled by low temperature and high throughput processing typical of plastic films. Organic solar cells potentially deliver further value throughout the supply chain, from ease of installation for construction companies to producers seeking simplified manufacturing integration.

Dr Robert Trezona, Head of R&D at the Carbon Trust said, "The launch of Eight19 and the deployment of low cost organic solar cells could help to revolutionise solar power production by opening up new markets. Cost reduction through the development of advanced technology and innovative design are key to driving forward mass production and making solar power more affordable."

“This investment is perfectly in line with our strategy to explore new promising market segments fitting with our sustainable development commitment. Furthermore, we are convinced that open innovation is key to leverage our research and development capability. We are happy to work in close partnership with prominent scientists to develop this breakthrough technology”, explains Pascal Juery, Group Executive Vice-President of Rhodia.

Professor Sir Richard Friend, Co-founder of Eight19 commented, “This represents a great opportunity to transfer new technology out of the university, based on recent advances in fundamental science. Solar cells made with organic semiconductors work very differently to those made with silicon and are closer in operating principle to photosynthesis in green plants.”

A world class management team underpins the technology development, with significant track record in making low cost applications using scalable roll-to-roll technology. Co-founder and Board Director Professor Sir Richard Friend is a world expert who pioneered the study of the electronic properties of a class of plastics called conjugated polymers and revolutionised the understanding of using these materials to make plastic semiconductors. He also previously co-founded Cambridge Display Technology (CDT) and Plastic Logic.

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For more information please contact:

Cambridge Enterprise Limited

Sarah Collins

Marketing Manager

Tel: +44 (0)1223 760 339

Mob: +44 (0)7500 883 612

Email: sarah.collins@enterprise.cam.ac.uk

Carbon Trust press office

Tel: 0207 544 3100

Email: press@carbontrust.co.uk

Table 1: Key advantages of organic photovoltaic (OPV) technology

Commercial Benefit	Technology / Rationale
Low Cost Module Production	Organic semiconductor materials can be processed from solution at ambient temperatures onto low cost flexible substrates. These properties allow manufacturing on continuous webs (roll-to-roll) at low temperatures and without capital cost intensive vacuum processes, resulting in rapid scalability with relatively low capital outlay.
Flexible, Robust, Lightweight Modules	Processing thin films on lightweight flexible substrates reduces material usage and enables more innovative ways of deploying the resultant modules and potentially opening new markets.
Significant potential performance improvement	Organic Photovoltaic (OPV) materials can be synthesized using standard organic chemistry methods, offering significant opportunity to vary and tune the properties the photoactive materials to create optimal systems. Organic solar cell power conversion efficiencies have been steady increasing over past few years, and currently champion cells of 8% have been demonstrated.
Abundant, Non-Toxic, Cheap Materials	Organic polymers and small molecules can be readily synthesised from abundant chemical pre-cursors and do not require exotic rare materials, reducing risks regarding materials supply or costs. The non-toxic nature of the final devices is an important element for widespread acceptance and enables OPV modules to be more easily deployed.
Reduced Balance of System Costs	Significant opportunity exists to exploit the unique attributes of solution processable semiconductors not only to lower the manufacturing cost of the solar cell itself - by opening the door to more innovative installation methods, reduced balance of system costs could be realised.
Low Cost Energy Production	Taken together, the inherent benefits of organic PV could lead to organic solar cells producing electricity at a lower cost than their inorganic counterparts.
Customisable Appearance and Design	A non-planar form factor also opens up attractive and innovative building design possibilities. Additionally the bandgap of organic semiconductors can be tuned over a wide range to achieve attractive colour and aesthetic effects, potentially providing advantages in areas where the appearance of modules is an important consideration such as deployment in the built environment.

Cambridge Enterprise Limited is a wholly owned subsidiary of the University of Cambridge, responsible for the commercialisation of University intellectual property. Activities include management and licensing of intellectual property and patents, proof of concept funding and support for University staff and research groups wishing to provide expert advice or facilities to

public and private sector organisations. Cambridge Enterprise provides access to angel and early stage capital through the Cambridge Enterprise Seed Funds and Cambridge Enterprise Venture Partners, and offers business planning, mentoring, and other related programmes. Over the past two years, income from licensing, consultancy and equity transactions exceeded £18 million, of which £14 million represents distributions to University departments and academics.

About The Carbon Trust

The Carbon Trust is a not-for-profit company with the mission to accelerate the move to a low carbon economy, providing specialist support to business and the public sector to help cut carbon emissions, save energy and commercialise low carbon technologies. By stimulating low carbon action we contribute to key UK goals of lower carbon emissions, the development of low carbon businesses, increased energy security and associated jobs.

We help to cut carbon emissions now by

- Providing specialist advice and finance to help organisations cut carbon
- Setting standards for carbon reduction

We reduce potential future carbon emissions by

- Opening markets for low carbon technologies
- Leading industry collaborations to commercialise technologies
- Investing in early stage low carbon companies

The Technology Partnership plc (TTP)

Europe's leading independent technology and product development company and creates new business based on advances in technology. TTP specialises in medical devices, instrumentation, consumer and industrial products, digital printing, communications, cleantech and security systems. Established in 1987, TTP is headquartered in Melbourn (near Cambridge, UK). www.ttp.com