

# Rolling out a strategy

Speaking exclusively to *New Electronics*, Industry Secretary Lord Mandelson discusses the key issues facing the UK's plastic electronics sector. By **Graham Pitcher**.



The UK is among the leading exponents of plastic electronics and, in the Government's opinion, the opportunities to be a major part of a whole new manufacturing sector are 'real and realisable'.

'Our vision', says the Government in a strategy document hot off the press, 'is for the UK to build on its position as one of the leaders in this sector, with a vibrant mix of SMEs, larger indigenous companies and global systems businesses'.

The document – Plastic Electronics: A UK Strategy for Success – outlines how the industry should deal with a number of perceived challenges. Top of the list is the fact that plastic electronics not only cuts across a range of disciplines, but also a range of interests – from universities to the private sector by way of all stops in between. Layered on this is a potential gap between R&D work and end users.

The report proposes the establishment of a Plastic Electronics Leadership Group (PELG) to champion the needs of the sector and to raise its profile. In most respects, the PELG will be expected to perform a similar role to the Electronics Leadership Council, bringing together a range of interests to coordinate activities in the sector.

But what is plastic electronics? Here's definitions from two leading developers. Adrian Geisow, senior research manager at HP labs in Bristol, said: "It's one of those terms for which everyone has a definition. But the important thing is to recognise that plastic electronics relates to an emerging range of materials and processes."

Martin Jackson, vp technology for Plastic Logic, said: "It's something that uses organic materials to make electronics. In a UK context, it can also be using flexible inorganic materials on an organic substrate. An example

is the use of zinc oxide as a semiconductor.”

The history of plastic electronics can be traced back to the mid 1950s, when experiments in a French university showed that organic compounds could exhibit electroluminescence. Interest grew in the technology during the 1970s, with work undertaken at the National Physical Laboratory to create polymer leds playing a major part. But it wasn't until the early years of the 1990s that the technology began to develop.

One of the leading companies at the time was Cambridge Display Technology (CDT), formed to exploit research undertaken by Professor Richard Friend in Cambridge University's Cavendish Laboratory, which showed that leds could be made using conjugated polymers.

The idea was that these polymers could be used as the basis for printable displays, produced using a roll to roll manufacturing process. When CDT launched, the world anticipated the early arrival of flexible displays which could be rolled up.

With plastic electronics poised to break into the mainstream, has the UK overlooked the potential of the technology in the past? If so, has a vital opportunity been missed?

Speaking exclusively with *New Electronics*, Secretary of State for Business, Innovation and Skills (BIS) Lord Mandelson said: "No. Plastic Electronics is only just emerging as an industry sector, but its potential has long been recognised by the UK government. Historically, this country has led much of the pioneering research in the field, with the Government investing more than £52million in more than 50 collaborative R&D projects since 2004. And, most recently, BIS has invested £20m in expanding the North East's Plastic Electronics Technology Centre into the national prototyping centre, which is helping bring new products to market."

Estimates forecast the global market for plastic electronics is expected to grow to \$120billion by 2020. How much of this business can the UK reasonably expect to hold?

"It's true that some forecasters are predicting very large markets for plastic electronics within the next decade," said Lord Mandelson, "although there is a degree of uncertainty over the nature and scale of this growth. Many parts of the embryonic supply chain are present in the UK and, together with recent investments, this puts us in a strong position to develop new products and exploit the commercial value of the technology. The vision within our new strategy is for the UK to build on these foundations and be a world leader as the markets develop."



PETEC is a unique facility, supporting plastic electronics development and prototyping



Plastic Logic is just one company developing flexible display technology

Potential applications for plastic electronics seem to be widespread. What sectors does Lord Mandelson think UK companies should target? "The largest growth in plastic electronics is predicted to take place in the markets for display screens, lighting and solar cells. We have strengths in each of these areas and UK companies are already exploiting early opportunities."

Will plastic electronics, for instance, enable breakthroughs in solar energy generation? Lord Mandelson said: "Currently, the UK is undertaking a lot of research into technologies for printing materials onto plastic or foil that can then convert sunlight into electricity. I understand these have great potential for making solar cells more cost effective. Although some of this work is not yet ready for the market, the Centres of Excellence are working with UK businesses which are poised to take advantage of the latest developments when they mature."

Plastic electronics needs particular skills. If the UK plastic electronics sector is to support 1500 people by 2014, as estimates believe, what needs to be put in place to ensure there are suitable skilled people available?

"Plastic electronics is a multidisciplinary field that needs people with skills in material science, chemistry and electronic engineering, for example," he said. "The Sector Skills Council for Science, Engineering and Manufacturing Technologies is now working with business and other skills councils to define future skills and training needs. And the Centres of Excellence in Plastic Electronics will play a major role in providing the training infrastructure, with a range of programmes already active."

Should existing engineers regard plastic electronics as a potential opportunity for career development?

In Lord Mandelson's opinion: "There could be significant benefit in making the UK's community of talented and experienced engineers more familiar with plastic electronics. If their creativity can be inspired by the new opportunities

in the sector, then the results could be highly productive and economically rewarding. For example, our existing pool of electronic design engineers – experienced in developing chips – should welcome the opportunities to design new products based on plastic electronic components. And, as the technology matures, there will be increasing demand for engineers that understand manufacturing processes previously developed for the graphic print industries.”

The Technology Strategy Board (TSB) has been pushing a number of ‘big picture’ projects. What role does it have to play with plastic electronics?

“The fact that our plastic electronics community is so well connected and advanced owes much to the industrial R&D projects funded by the TSB,” Lord Mandelson noted. “The TSB also funds the Knowledge Transfer Network in Photonics and Plastic Electronics, which makes sure the community is well informed and joined up. And the TSB will continue to play a vital role in helping UK organisations work collaboratively to develop commercially viable products and processes.”

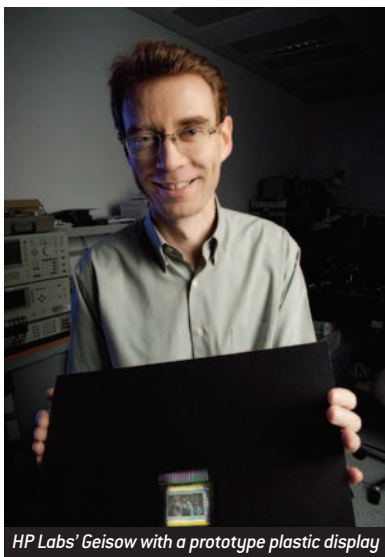
Already, five centres of excellence have been set up (see box). Will this be enough to support this developing sector?

“The five UK centres of excellence span a wide range of activities,” said Lord Mandelson, “from fundamental materials research, through applied R&D, to establishing reliable manufacturing processes. Together, these centres provide the UK with a world class infrastructure for plastic electronics. We don’t believe there is currently a need for any further centres, but a range of other, smaller scale activities – often within universities – is also helping to enhance the UK’s capability.”

With the UK science base in plastic electronics well established, what else needs to be put in place to ensure that this expertise can be accessed?

“The UK science base is actively engaged in world class research in many aspects of plastic electronics and the Centres of Excellence play an important role in promoting this work,” he commented. “But there is also a need to ensure that the potential end users of plastic electronics are aware of what the new technologies can deliver. The Photonics and Plastic Electronics Knowledge Transfer Network will make a significant contribution here, by helping technology providers engage with potential customers.”

As with all sectors, a supply chain is needed to ensure that products can



HP Labs' Geisow with a prototype plastic display

reach the market. Is the supply chain for plastic electronics in place? Are there ‘holes’ and, if so, how can the ‘holes’ be filled?

According to Lord Mandelson: “The UK has strengths throughout the plastic electronics supply chain, with companies active in developing and manufacturing materials, device and product design and system integration. Any ‘holes’ in the supply chain can either be overcome via international commercial links or by attracting companies to set up in UK. And UK Trade & Investment performs an important function here in successfully promoting the UK as an attractive place to start and grow a business.”

What do you see as the most important challenge facing the UK’s plastic electronics sector?

“Our new strategy document identifies five main challenges facing the sector, which the new Plastic Electronics Leadership Group will work to address. But

prioritising these challenges is not easy – every organisation active in the sector would recognise the significance of each, but would probably rank them differently, depending on their own position in the value chain; the scale and maturity of their business and the markets they focus on.”

#### The view from industry

Geisow’s view of the plastic electronics strategy? “It’s a good attempt to try to encourage as much synergy as possible. There are lots of good companies who can push this vision forward. I would rather see companies do a good job here, rather than see the technology exported. Plastic electronics is a good bet,” he concluded.

Jackson also sees the UK as having a good position in plastic electronics. “The technology was developed at Cavendish Laboratory, there’s a good man at Imperial College in Iain McCulloch and Manchester is doing fundamental work in materials. Meanwhile, there’s a whole set of companies working in the technology – there’s a cluster in Cambridge, for example.”

Jackson’s view of the strategy? “The PELG should look at the whole life cycle for plastic electronics, not just at start ups. One of the challenges for any new industry is that it takes longer than the life span of one government to get things working. But having a consistent strategy for ten years is difficult. Plastic electronics will need consistency of approach, because change will not be helpful.” he concluded.

### Centres of excellence

**Printable Electronics Technology Centre (PETEC)**  
PETEC is the national plastic electronics prototyping centre.  
[www.ukpetec.com](http://www.ukpetec.com)

**The Welsh Centre for Printing and Coating (WCPC)**  
Part of the School of Engineering at the University of Swansea, WCPC is a leading R&D centre for printing and coating processes.  
[www.swan.ac.uk/printing/](http://www.swan.ac.uk/printing/)

**The Cambridge Integrated Knowledge Centre**  
Current work includes organic photovoltaic devices, organic thin film transistors, displays, printable waveguides and large area transparent electronics.  
[www-g.eng.cam.ac.uk/CIKC/](http://www-g.eng.cam.ac.uk/CIKC/)

**The Organic Materials Innovation Centre (OMIC)**  
Part of the School of Chemistry at the University of Manchester, OMIC is developing new conducting, semiconducting and dielectric materials for controlled deposition.  
[www.omic.org.uk](http://www.omic.org.uk)

**Imperial College Doctoral Training Centre**  
Located within Imperial’s Physics Department, the centre will train scientists in plastic electronics, with the aim of provide technology leaders in the field.  
[www.imperial.ac.uk](http://www.imperial.ac.uk)