



GREAT WESTERN RESEARCH *focus*

Since its inception, Great Western Research [GWR] has set about promoting collaborations between the highest quality research groups and the most forward thinking businesses in the South West in order to support the growth of the region and to demonstrate just what is possible when academics and businesses collaborate. A recent partnership, formed through GWR, between Hewlett Packard Labs Bristol, the University of Exeter, the University of Bristol and GWR PhD student James Parsons, is focusing on delivering an innovative solution to a very real problem

Innovation On Display

Hewlett Packard (HP) are a global leader in information technology equipment and solutions, and will generate a turnover in excess of \$100 billion in 2008. It is no surprise therefore that the HP Labs Bristol research centre is considered to be amongst the leading corporate research facilities in Europe. Since it opened in 1983, the site at Bristol has cultivated leadership excellence in a wide range of technical fields including display applications and imaging. It is this area of research that has been the focus of HP's partnership with GWR PhD student James Parsons, the University of Exeter and the University of Bristol.

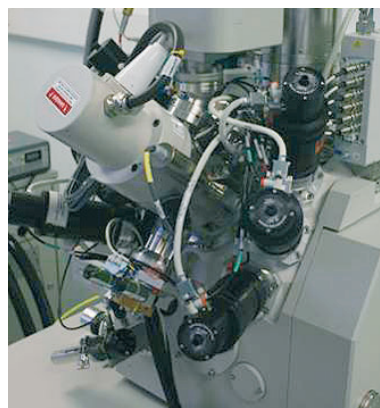
Historically, liquid crystal displays (LCDs) operate by modulating the light produced from a source located behind the display. A disadvantage of this approach is that the device not only consumes significant amounts of electricity, but when viewed in bright light it can also suffer from glare. James's research investigates visual displays which work by scattering the available ambient light, with an initial voltage input being required only to determine the initial viewing state. No further power or backlight would then be necessary to maintain optimum viewing comfort, and objects on the

screen could potentially appear more 'life-like', with text, for example, resembling the look and feel of pages in a physical book.

The implications are significant as at present there are few devices available which work by scattering ambient light, and such low power devices could be used in many different applications, including digital watches, display monitors, televisions and mobile phones.

In his quest to create a new generation of visual display, James' research has centred around a relatively new type of nano-technology within physics, known as plasmonics (the interaction of light with metals). His work has involved simulating the optical response of microscopically sized metallic particles, often less than a wavelength of light in dimension, with a view to hosting these within an LCD.

The main challenge has not only been to investigate particles with a strong scattering response, but also to develop structures which are effective over a wide range of illumination angles (so the image is not distorted when viewing off-angle). By integrating small metal particles into



"[GWR] is about ensuring the sustainability of internationally-excellent research in the South West"

Prof. David Billington

"[This is] an ideal project to combine academic free thinking, together with the necessary focus to pioneer a technology towards a commercial application..."

James Parsons, GWR PhD Student



LCDs, it is hoped that the angular response of displays could be greatly improved, with the added possibility of reduced power consumption.

“James’ research has centred around a relatively new type of nano-technology within physics”

James has found it extremely beneficial working alongside an industrial partner such as HP as this has enabled him to fabricate his structures in their specialist laboratory, and thus bring forward his theory much faster than working alone in his University’s facilities.

Furthermore, the collaborative nature of the GWR PhD Studentship has enabled James to work in partnership with colleagues in other research groups both in and beyond the South West. Links made through the University of Bristol (Dr. Jason Reily is a visiting lecturer at Bristol) have led on to working closely with PhD student Phil Mason and his supervisor Dr. Jason Reily at the Department of Materials, Imperial College, London, for example. Their experience and expertise in novel electrodeposition techniques to fabricate Gold nanorods over large areas has proven invaluable to the project.

James has also worked with other divisions of HP Labs, including the HP Palo Alto research facility, based in California, frequently exchanging computer simulations and ideas for possible structures over the internet.

His main supervisors – Prof. Roy Sambles F.R.S. and Prof. William

Barnes from Exeter University along with Dr. Stephen Kitson at HP - have been a constant source of inspiration, always willing to input ideas and offer James direction where necessary. “It has been an ideal project to combine academic free thinking, together with the necessary focus to pioneer a technology towards a commercial application and I feel that I’ve got all the resources I need in hand for a successful project!”

James spoke at the SPIE Photonics Europe conference earlier this year in Strasbourg about his study of the localised modes of nanoholes in optically thin metal films, with an accompanying publication in the SPIE conference proceedings.

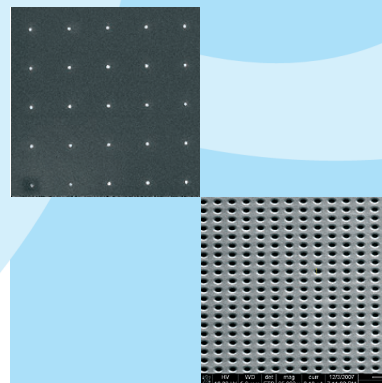
GWR Studentships and Fellowships are stimulating the building of new partnerships with major research funders in the region, and thanks to GWR over £2 million of new public and private investment is being made into research projects in the South West of England.

The inspiration for the GWR concept is simple - “The intention is that it should increase interactions between University research groups and business, and therefore build capacity and attract more money for research,” said Prof. David Billington, Executive Director of GWR - “It is about ensuring the sustainability of internationally excellent research in the South West and preparing the region for the technologies of the future, by investing in collaborative forward looking research programs.”



GWR is a £14m collaborative project which funds 130 PhD Studentships and 20 Research Fellowships at universities in the South West of England

All GWR studentships are real collaborations, each project is 50% funded by GWR and 50% by the business partner



For further details please contact Dr Paul Hudson
p.s.hudson@exeter.ac.uk 01392 269104
 Kay Building, Exeter University, North Park Rd, EX4 4QF

