Meet Dr Tim Mortensen

Tim obtained an MPhys degree from Swansea University in 2009 and completed his EPSRC funded PhD on the "Manipulation of the magnetron orbits of particles and clouds in a two stage buffer gas accumulator" at the same institution in 2013. During his research with antimatter systems at Swansea and later in Saclay, Paris, he not only gathered and analysed experimental data, but designed and built a range of bespoke hardware and software solutions to facilitate simplified data acquisition and analysis. Upon his return to the UK in mid-2014, Tim was offered a role on a project in the field of printed electronics at the Welsh Centre for Printing and Coating (WCPC) to create a low cost printed pressure sensor. The project far exceeded its expectations, the technology behind the sensor has been patented and is in the process of being commercialised by industrial partners of the university. He now works on the FLEXIPOWER project developing printed wireless energy harvesting systems.

From having originally started my research career with the backing of the EPSRC developing novel techniques for trapping positrons, to now, once again, be working on an EPSRC project in the field of printed electronics is an eye opener to the wide ranging high quality research that is enabled thanks to their funding. Experiments to help uncover fundamental laws of the universe, performing detailed measurements of the properties of antimatter, are being funded by the same body investing in the wide range of technologies required to facilitate the production of printed electronic devices.

My recent work, as part of the ambitious Flexipower project, seeks to produce ultralow cost wirelessly powered devices using printed electronics techniques. Wireless power is by no means new and is increasingly being found in the hands of everyday consumers through household items such as electric toothbrushes and mobile phones. However, the relatively new field of printed electronics can't simply reuse these same designs because many of the required components simply don't exist.

Development of new components analogous to their traditional electronics counterparts is required and this early stage research forms the heart of the Flexipower project. These components will be developed and tested and will then form a complete prototype wireless energy harvesting system, which could ultimately become part of future commercial products.

As the capabilities of printed electronics increases there will be a range of applications where ultralow cost devices can be used in place of traditional electronics, however, if these technologies are still reliant on traditional batteries their flexibility will be reduced and the battery will likely be a significant proportion of the total device cost.

Additionally, there are a number of environmental concerns with the production and proper disposal of batteries that will become more apparent as the number of batteries used by Internet of Things (IoT) and other smart devices increases rapidly in the coming years. The use of wireless energy harvesting allows a low cost, printable alternative to traditional batteries and will enable a large number of new technologies that were either too expensive or too bulky to be made with standard electronics.

Uses for the technology are many and varied, from disposable bandages which can monitor the status of a wound and inform the user of early signs of infection, to smart packaging which can inform the shopper that the product is genuine and intact. The truth is however, the best uses for this technology are likely things we simply can't imagine yet. As with most radical new technologies, creating a cheap and capable platform often results in new uses that are completely unexpected. I look forward to seeing how people use this technology in the future and anticipate being pleasantly surprised.