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Case study



SmartKem Ltd.

Based in St Asaph, SmartKem delivers 'organic' semiconductor materials for the manufacture of ultra-thin, lightweight and flexible electronics that will be used to electrically drive existing and future generations of display-based products including TVs, PCs, tablets and mobile phones. Unlike traditional silicon semiconductors these materials can be processed by printing and coating onto thin or flexible plastics at room temperature and in ambient conditions enabling the delivery of radical new form factors for these electronic products.

A word from the CEO of SmartKem, Steve Kelly...



Steve Kelly

"We have been collaborating with Bangor University for a number of years now. Originally we came to Bangor looking for technical support and access to the high calibre equipment there. We wanted to grow our business and the R&D facilities at Bangor suited us technically and the location was perfect. The

world class expertise and breadth of experience of Professor Taylor's Organic Electronics Research Group has been of immense value to the company in understanding the performance requirements of our proprietary materials for implementation with state-of-the-art transistor and circuit architectures"

Short Knowledge Transfer Partnership (sKTP)

Following a brief programme of preliminary tests in the Organic Electronics laboratories at Bangor, SmartKem and Bangor University, together with strong support from the Welsh Government's A4B team, applied successfully to the UK Government's Technology Strategy Board (TSB) for a short Knowledge Transfer Partnership (sKTP) grant to undertake a focused 40-week research programme. Dr Colin Watson, a Bangor graduate who had just completed his PhD research on organic electronic devices, was engaged as the sKTP Associate for the programme. Using the techniques and expertise acquired in his PhD studies, Colin developed a protocol that allowed him to fabricate high quality transistors using SmartKem's new organic semiconductor (OSC) materials. This protocol is now being used by the company to demonstrate that its latest OSC materials have achieved world-leading



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charge carrier mobilities for p-type organic blends, making them extremely attractive to the world's leading electronics companies. Using this new protocol, Colin has also shown that these transistors can be coupled to form inverters, the circuit element on which all digital logic circuits are based.

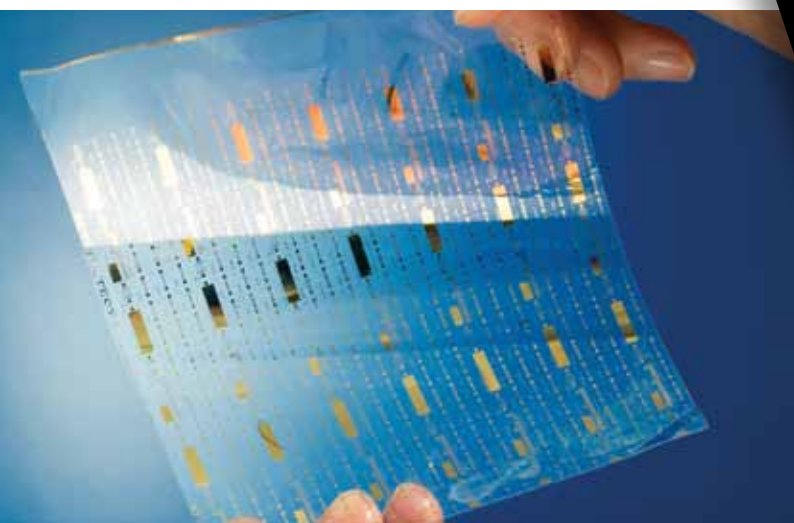
In addition to selling its new materials, SmartKem also offers technology transfer services, ongoing technical support and is especially interested in joint development programmes and on-site training to licensees or potential licensees. The work completed at Bangor has provided SmartKem with commercially-important technical knowhow to promote its products and services. More importantly, the successful outcomes of the sKTP project convinced the company that, in order to further improve its materials and market position, it should deepen its relationship with Bangor University by applying to the TSB for a full KTP project lasting 2 years.

Outcomes

The team has just learnt that its application to the TSB for a 2-year KTP project has been successful. The work to be conducted will build upon the foundations established in the SKTP. This time the focus will be on establishing the long-term electrical stability of transistors made using SmartKem's latest materials and feeding back the key information needed to further improve their materials.

With financial support from many sources including the Welsh Government's A4B programme, the Higher Education Funding Council for Wales and the Engineering and Physical Sciences Research Council, Bangor University has facilities for Organic Electronics Research that match those found in the world's leading Universities. The technological capability and research output of the Organic Electronics Research Group was a major factor in the School of Electronic Engineering being ranked 2nd for Electronic Engineering research in the last UK-wide Research Assessment Exercise. As evidenced by the successful collaboration with SmartKem, this capability is also being harnessed for the benefit of the Welsh economy.

The interaction with SmartKem has seen Bangor University's technology brought closer to market. New research lines have been identified, the results of which will be of great benefit to SmartKem and other companies in the Plastic Electronics sector, which is a priority area for support from the UK and Welsh Governments.



An array of flexible OTFT's (Organic Thin Film Transistors). Typical of the ones SmartKem have made and had characterised at Bangor.



SmartKem's flexible OTFT technology will enable the production of a new generation of flexible display products.