

Creating a high performing barrier film for OLED and PV applications



Beneq Roll to Roll Atomic Layer Deposition Tool

CPI Services

- *Prototyping demonstration and scale up*
- *Materials investigation*
- *Product and process development*

High Barrier Performance for Plastic Electronics 'HiBPE' was a collaborative research and development project which focused on developing a high performance barrier material for flexible photovoltaic (PV) and OLED applications. The three year Innovate UK project ran from April 2013 to February 2016 and brought together technology developers CPI and Specific, alongside technology provider Camvac and end users Inside2Outside, G24 Power Ltd and Tata Steel.

The flexibility, lightweight and low cost nature of flexible photovoltaic and OLED devices is attractive for a number of future applications in the build environment such as lighting, solar power generation and industrial roofing. However the technology is not yet in the mass market as developmental progress is needed to produce OLED and PV devices at the price points, manufacturing volumes and cell efficiency requirements that industry desires.

The aim of project HiBPE was to develop a high performing barrier material for OLED and PV which would increase the lifetime of these devices and help bring these new innovative technologies to market. The development of OLED and PV with flexible form factors opens up a host of opportunities for designers to embed energy harvesting and added functionality into their products.

Project Achievements

The project produced a robust, high quality barrier film with a water vapour transmission rate of 10^{-4} g/m²/day and at a price lower than current available films on the market. The barrier film was made using CPI's roll to roll atomic layer deposition technologies and tested on flexible OLED and PV devices at pilot production scale.

Another key achievement from the project was the successful adaptation of Camvac's patented In-Vacuo-Coating system used in its "non-electronics" commercial business, eg food packaging, to the more demanding barrier applications in flexible electronics such as OLED and PV.

CPI's role in the project was to utilise roll to roll atomic layer deposition techniques to produce the barrier film. Atomic Layer Deposition (ALD) is a specialist barrier coating technique which is being utilised by CPI to add protective layers to flexible polymer substrates and devices.

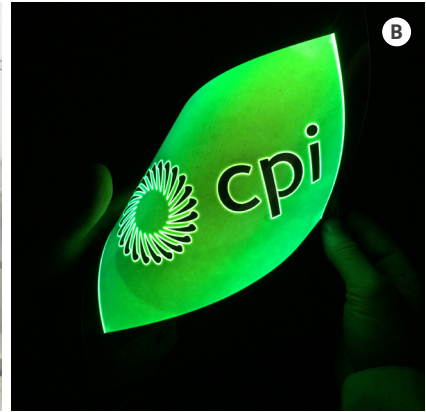
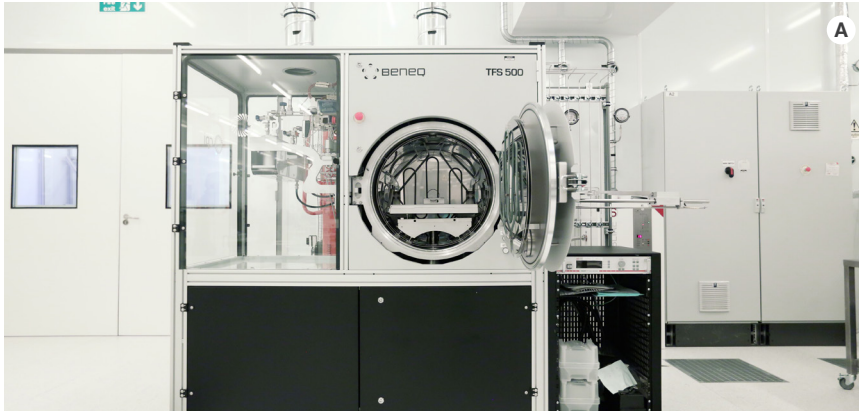


View more case studies at:

www.uk-cpi.com/case-studies

Find out how we can help your business:

☎ +44 (0)1642 455 340 ✉ info@uk-cpi.com



A: Beneq TFS-500 Batch Scale Atomic Layer Deposition Tool B: Flexible OLED

Films deposited by ALD give ultra-barrier levels of protection against the ingress of moisture and oxygen, to flexible substrates that are used in the production of optoelectronic devices, amongst other applications. ALD has the potential to deliver a single layer coating which is both highly dense and conformal, giving rise to excellent barrier performance. This barrier film produced in HiBPE was tested on photovoltaic and OLED devices, with G24 Power making the photovoltaic devices, whilst CPI produced the flexible OLED device.

“CPI is delighted with the outcome of the HiBPE project. Working in collaboration, the partners have been able to produce a barrier film with excellent barrier properties and is another step in the right direction for the commercialisation of flexible photovoltaic and OLED applications. We have tested and proven the film at pilot production levels, the next steps are to optimise and refine the engineering of the roll-to-roll processing, to develop a robust proven moisture barrier at the right price to facilitate mass market adoption.”

- Phil Hollis, Project Manager, CPI

“Camvac is pleased to have been part of the HiBPE project and to have contributed to the positive outcome achieved. We have gained knowledge and experience of the requirements for production of ultra-barrier materials through collaboration with the other partners, and have been able to apply this in developing our IVC system for use in this new and challenging application. We would like to see further progress in all areas of the process to enable it to become commercially successful.”

- Bob Jarman, Director of Engineering & Process Development, CAMVAC

“G24 Power has spent several years searching for a suitable moisture barrier film for its flexible PV modules. The flexible barrier properties realised by the project represent an exciting opportunity for the UK to compete with the very best currently available and at significantly reduced cost. Developing this barrier film further will play an important role in truly commercialising flexible photovoltaic products in applications ranging from building integration to consumer products.”

- Mark Spratt, Chief Technologist, G24 Power Ltd

“TensilePV will play a very important role in bringing PV applications into Building Integrated PV, as opposed to the existing (and materially wasteful) Building Applied PV. The development of the low cost, lightweight, flexible and transparent barrier material from the project will play an exciting role in the commercialisation of TensilePV. Going forward, we are excited to be working with the project partners to bring TensilePV to commercial reality.”

- Robert Carpenter, MD, Inside2Outside Ltd

View more case studies at:

www.uk-cpi.com/case-studies

Find out how we can help your business:

☎ +44 (0)1642 455 340 ✉ info@uk-cpi.com

CATAPULT
High Value Manufacturing

