About CPI – CATAPULT CENTRE
First UK Technology Innovation institute

CPI - Centre for Process Innovation
Founded in 2004
• 200 employees
• £75M investment to date
• UKs first Technology and Innovation Centre
• Focus on:
  – Sustainable Processing
  – High Temperature processing (>1000c)
  – Bio- Pharma biologics centre – December 2012 (£38m)
  – Printable Electronics

2007 UK National Centre in Printable Electronics
• 2011 First UK Technology Innovation Centre TIC
• 50 employees
• £30m investment to date
CPI Overview

CPI is a design, development and prototyping facility for the emerging Printable Electronics (PE) industry.

CPI offers equipment for scale up to full size

Our customers bring their problems, inventions, and innovative business ideas

CPI works with clients to bring new PE products and processes to market quickly and efficiently, by offering facilities and expertise that help reduce the level of R&D risk and capital investment.
Technology Areas – reflecting industry need

OTFTs for Flexible Arrays

Solid State Lighting (SSL)

CPI Process Equipment & Materials Technologies

Integrated Smart Systems (ISS) and Sensors

Solar Cells

From innovation to commercialisation
CPI offering 1

• Facilities
  – 2 clean rooms (Class 100 & 1000)
  – Formulation, optical, & electrical test labs
  – Print and pick & place lines
  – 12 incubator offices

• Prototyping
• Fabrication
• Access to Scaleable Toolsets
• Incubator Space
• Techno-commercial Expertise
CPI Offering 2: scale and high yield equipment

Companies proof manufacture before getting investment
CPI – Capability in Smart Systems

- **Multifunctional print pilot line**
  - Standard integrated press
  - Transferable into existing supply chains
  - Unique combinations of print process
  - For novel integration
- **Pick and Place of components**
  - Integration with silicon
  - Wide electronics functionality, existing and new
- **Print finishing – cut crease, lamination**
  - Rapid automated integration
  - Low cost ‘printegration’
Nilpeter Print Production Platform

Electronic Integration and rapid manufacture

• Flexo
• Gravure
• Offset litho
• Rotary Screen
• Narrow web (420mm) Nilpeter reel to reel printing press
• Variety of substrate types 25-370 microns

From innovation to commercialisation
Technology Focus: Transistor TFT arrays

- 106 ppi e-paper backplane
- Produced on a glass substrate
- 6 micron minimum feature, 5 micron design rule (overlay accuracy)
- 3” (75mm) diagonal, 48,000 transistors

Display, sensors, micro circuitry
Current: Integrated lighting and PV

- Transparent OPV development for window glass for solar control and energy generation.
  - Simple PV devices

- OLED lighting
- Focus on monochrome colour for high value applications
  - Simple OLED devices for medical applications,
  - needing short lifetime, low light intensity
  - Super thin, colour tuneable
Case Study: Change in form factor

Integrated Photovoltaic: Development of DSSC roof sheets on steel encapsulated with R2R produced Barrier Film

- **Used:** CPI’s R2R Sputter coater, Epigem dip coating, Tata roll coating at Shotton

- **Next Steps:** Tata development programme: at SPECIFIC in Swansea, & Shotton PV Accelerator
- Using conventional roll printing and screen printing processes onto steel

Tata Steel

From innovation to commercialisation
Case study: device integration

- Keypad display fully printed by MAPP Systems
- Based on existing industrial control application
- Key product differentiation
  - Cost-effective
  - Thin form factor
  - Robust & flexible
  - Highly scaleable
  - Easily customised
  - Low-voltage
  - Low-power
Case Study Integrated display development

Product prototype development of a membrane switch with a printed display “Printegrated” into the circuit layer
Case Study – New applications Electronic Nose

From innovation to commercialisation
Case study: Interactive Poster

Short run lengths, low cost production,

- Poster printed on one side using commercial press
- Electronic interconnects & circuit printed on reverse side.
- Active components – speaker, control chip glued to circuit using print finishing line at speed
- Uses – museums, car show rooms, schools,
- Print production speed per minute, Cost approx $10 per unit
- Produced by Colour Heroes, Novalia and print Yorkshire, CPI project management

Active touch points

Loud speaker laminated to back

From innovation to commercialisation
Printed Electronics competencies at CPI

- **Formulation**
  - Enables the development of functional inks for printed electronics, including metals, dielectrics, polymers, substrate – generic to most projects

- **Coating**
  - Fine coating applications of extreme uniformity and continuity for high yield electronics applications using evaporation and solution methods - generic to most projects

- **Encapsulation**
  - Barrier film, edge seal, in-situ encapsulation – generic to most projects

- **Device Testing**
  - OLED, TFT, and Smart device testing of device elements and formulations – barrier measurement

- **Process Engineering**
  - Electronics fab, plastic and print process – 12 experienced engineers in this field
Summary

- CPI UK National Printed Electronics centre, reflected in £30m investment 2008-11
- Equipped with industry relevant toolsets operated by industry focused personnel
- Shown the Development and introduction of smart products using AVAILABLE TECHNOLOGY
- Simple products with unique features
From innovation to commercialisation

Thanks for your kind attention

Tom Taylor

www.uk-cpi.com