Academic Research to Industrial Exploitation

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Presentation Outline

- The Challenge for Successful R&D Projects
- An IeMRC example:
  - research
  - development
  - industrial implementation
- Sources of help
- Summary
The Challenge for Research

• Britain has a great track record of major inventions;
  – TV, radar, computer, electric motor, light bulb, carbon fibre, jet engine

• Less successful in exploiting the technology

• A key challenge is turning the research into useful technology

• Many areas in the UK where we are world leaders and need new technology – power electronics, renewables, aerospace medical, military, etc
• How do you capitalise on a successful R&D project?

• There may be many barriers to taking it forward
  – unable to find interest, funding, investors
  – too busy with new projects
  – don’t have experience of collaboration

_Beware of the Valley of Death_
• Need to move up the TRL levels
• Various routes possible
• One example is to secure further support for the transition
• Engage with industrial partners
• Apply for collaborative funding
The Valley of Death

Lord Browne of Madingley

‘The valley of death was responsible for UK commercialisation of R&D lagging behind its competitors, despite a ‘world-beating knowledge base’

‘All too often we lag behind our competitors in translating the fruits of our scientific research into commercial success’
An Example Route

IeMRC supports project at Coventry University – requires industrial collaborators

TSB supports industrial feasibility study

European Commission provides support for first industrial implementation
The Research Phase

• IeMRC funded a 3 year programme at Coventry University
• Demonstrated the potential of ultrasonics in electronics manufacturing applications
• Reductions in operating temperatures and the use of aggressive chemicals in adhesion promotion
• Offers low temperature more benign sustainable processes
• Assembled interested partners and applied for TSB funding to demonstrate feasibility
• Nine month feasibility study enabled technology to be evaluated in an end user environment
• Demonstrated potential for use in PCB manufacturing
• Successful outcome gave confidence for next stage
Industrial Implementation

**Sustainable Ultrasonically Enhanced Chemical Processes**

- Applied for European funding under the Eco-Innovation Scheme – first implementation
- Project ‘Susonence’ funded by the EC
- Seven partners; two end user companies, two European trade organisations and an equipment builder
The key aims of the Susonence project are to:

- implement ultrasonically enhanced surface modification processes for removing surface layers, etching, and texturing a variety of widely used substrates with greatly decreased chemical consumption
- enable a step-change in competitiveness within the surface finishing and printed circuit board manufacturing sectors
- significantly decrease environmental impact
The project is delivering five industrial scale plants
Two will be used on each end user’s production lines
Covers both PCB and metal finishing applications
The fifth plant will be used for further process optimisation and development work
The plants will be installed in factories in Paris and Prague
Plans in place for international exploitation at end of project
Maskless Electrochemical Surface Modification Process – The Enface Way

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Pattern Transfer: EnFACE

- Patterned metallic counter electrode or tool
- Current lines diverge into the electrolyte
- Pattern transfer is feasible **ONLY** if there is selective etching or plating
- Place the pattern and substrate in close proximity
- Optimise reactor geometry electrode gap, flow, pressure drop
Scale up of EnFACE – MTG Research, Royenface, Coventry University, Pragoboard (CZ), Protection des Metaux. (Promet), and International Project Management, Plating and Materials (FR) and EIPC Services B.V. (NL)

Development of “tank reactors” with unique ultrasound agitation

Production scale demonstrator for plating and etching PCBs and components with copper and other metals

http://www.pcb007.com/pages/zone.cgi?a=89157
Mesmoproc: Maskless Electrochemical Surface Modification Process

Posted on 09/10/2012

A novel low cost, energy and resource efficient, sustainable process to enable selective metallisation of microscale devices, components and printed circuit boards (PCBs).

The Mesmoproc project aims to achieve the first application of an innovative new process that combines electrochemical reactor engineering with innovative ultrasound agitation to enable selective metallisation of microscale devices, components and printed circuit boards (PCBs) without requiring the use of repetitive conventional photolithography stages. It will implement a new invention, Enface - electrochemical nano and micro fabrication via sustainable chemistry and engineering, to transfer patterns onto substrate surfaces. In the Enface process copper is first etched off the copper from selected areas and thereafter copper is deposited directly on these areas which remain metallised. The ability of Enface for selective copper etching and plating in micro-sized areas has already been proven. Enface uses a patterned tool to transfer patterns selectively, which eliminates the need for photolithography of substrates, thereby offering the potential for a much simpler process. The project will implement first industrial plants within partner SMEs’ facilities in both the metal finishing and printed circuit board-manufacturing sectors. Key factors influencing the potential uptake of the developed technology are the increasing costs of raw materials, energy, treatment and disposal of waste, where significant potential savings have been identified. These costs are all projected to continue to rise due to a combination of legislation, in the instance of waste, and escalating world demand, primarily from Eastern manufacturing areas, in the case of materials. As a result, there is both a competitive need and an opportunity for significant cost benefits in the reduction of direct manufacturing overheads in industrial sectors that are of critical importance across Europe.
Summary

• Moving from basic research towards commercialisation can be a difficult challenge

• There are various routes possible

• One mechanism involves finding and working with industrial partners who can help take it forward to exploitation

• Various schemes at the UK and European level

• Secure additional collaborative support funding
• The IeMRC wants the project it funds to be taken forward and implemented for the benefit of UK industry

• Utilise funding schemes at the UK and EU level

• The IeMRC can provide advice on;
  - finding partners
  - providing advice on funding schemes
  - proposal writing
Sources of Help

- There are numerous organisations that can provide advice and direction at the regional, UK and EU levels
- Talk to people who have successfully used this route
- Use the Knowledge Transfer Network – eg ESPKTN
- Build your own interest group – personal contact is best
- Technology Strategy Board (UK) and Cordis (EU)
- Catapult Centres - help transform ideas into new products

Information about the IeMRC

- Visit the IeMRC website
- Contact IeMRC’s staff
- Read our annual reports
- Attend our Annual Conference on 25th September here in Loughborough
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