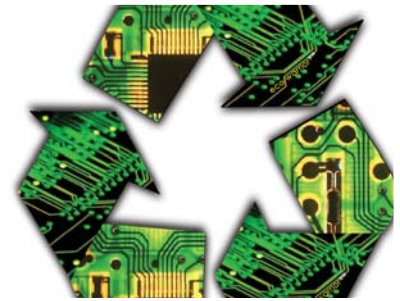


IeMRC Research Portfolio Themes



Sustainable manufacturing, products and processes

Research Issues:

- Energy
- Green electronics
- Single unit manufacture
- Sustainable manufacture
- DFAssembly
- DfDisassembly
- Process control
- Partitioning
- Power management
- DfRecycling
- Business modelling

Vision: to meet the needs of the current generation without compromising the ability to meet the needs of future generations. For the electronics sector, this means designing and developing new technologies that underpin continued growth while using more innovative materials, less energy and generating less waste and complying with environmental legislation.

The desire to address environmental and sustainability aspects in proposals has played an important part in the success of many IeMRC projects. We have supported several where the key focus has been aimed at addressing these issues, examples include the work carried out by Brunel, Coventry and Surrey Universities.

Cleaner processes: sonochemistry research at the University of Coventry used ultrasound for the surface modification of key materials found in electronics fabrication. This has developed benign and lower temperature processes using ultrasound for surface modification. With ultrasonic assistance, aggressive chemicals and high temperature processes can be replaced with near-room temperature dilute solutions.

End-of-life: industry faces challenges around management of products at end-of-life. A key objective is to make recovery and recycling economical by providing qualified materials for reuse. Recycling of polymers from electronics has been limited because of the difficulty in identifying and separating

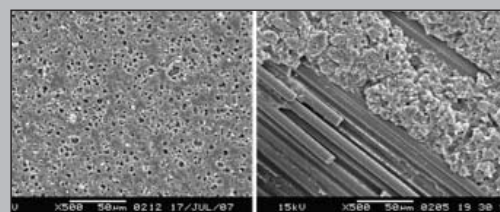
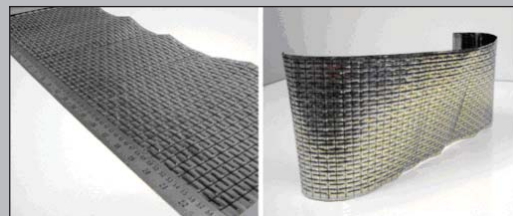
polymers from mixed waste streams. The University of Surrey has developed a rapid assessment technique enabling better use of end-of-life polymers. The method uses broad wavelength spectroscopic techniques with multivariable statistical analysis to rapidly identify the type and quality of thermoplastics in mixed polymer waste streams.

Novel products: Brunel University has investigated thermoelectric devices grouped as thermoclusters for converting heat to electricity. These are potentially well suited to harvesting 'low grade' heat energy. An application would be integrating such thermoclusters with photovoltaic panels, removing heat from the panels, maintaining their photovoltaic conversion efficiency and generating additional power.

Brunel has developed a simple three-step process for making the thin-film thermoelectric arrays and it has been designed for high-volume production using a reel-to-reel deposition and patterning process.

The IeMRC balances technological objectives with the broader societal goals of sustainability. Establishing and maintaining this balance is increasingly challenging as electronics move outside established application areas. However, there are numerous opportunities to provide the novel solutions needed for increasingly innovative and enhanced performance products, whilst also enabling them to meet the stringent legislative and societal demands around minimised environmental impact and sustainability.

*Brunel University's
Functional thermoclus-
ter sheets*



*Pre- & Post- sono-
chemical processing of
polymer surfaces*