# Advanced materials and nanotechnology

## Research expertise

The University of Birmingham is extremely strong in the area of Advanced Materials. We have expertise which covers everything from materials synthesis, through analysis and characterisation in both nano and bulk functional materials. Much or this expertise is applicable to the analysis of composites, coatings, metals, ceramics and powders.

### Applied research groups and initiatives:

**IRC in Materials Processing (http://www.irc.bham.ac.uk/researchthemes/advancedmat/index.shtml)** - This group focuses on improving current materials, developing new materials and simultaneously to develop their processing and the influence of processing on microstructure and properties.

**Manufacturing Technology Centre (http://www.the-mtc.org/)** - The University is a key founding partner in the development of the £40M Manufacturing Technology Centre (MTC) at Ansty Park near Coventry. The vision for the Centre is to become a world-class global research facility: “Making the Future” through transformational manufacturing technology development. The Centre currently focuses on 5 major technology themes:

- Netshape Manufacturing (NSM)
- High Integrity Fabrication
- Intelligent Automation
- Advanced Tooling and Fixturing
- Computational Engineering

**The Nanoscale Physics Research Laboratory (http://nprl.bham.ac.uk/)** - The NPRL is committed to the transfer of new concepts and technology from the research laboratory into industry, including our spin-out companies, creating opportunities for process innovation and sustainable economic development.

**Science City Project (http://www.birminghamsciencecity.co.uk)** - In collaboration with the University of Warwick the University has received an investment of over £20M in equipment and facilities to enhance its industrial research capability. The result is the development of one of Europe's leading research facilities in Advanced Materials with capabilities ranging from nano through to x-ray diffraction.

## Case studies

Open all sections

## Unilever UK - Optimisation of product formulations

Science City researchers at the University of Birmingham have been working with Unilever UK. Unilever is one of the world's leading suppliers of fast-moving consumer goods. Their three global divisions cover foods, home care and personal care. Within the personal care market, they are global leaders in products for skin cleansing, deodorants and antiperspirants.

Unilever employ 179,000 people in 100 countries worldwide and invest €1 billion every year on research and development.

Science City researchers have been working with Unilever to investigate the distribution of active ingredients for the application for personal hygiene products.

The work has made use of one of the many state-of-the-art pieces of equipment that has been made available as part of the Science City programme, a Confocal Raman Microscope. Raman microscopy, and in particular confocal microscopy, has very high spatial resolution and Raman imaging is a powerful technique for generating detailed chemical images based on a sample’s Raman spectrum.

Raman spectra were acquired using an infrared laser source together with two-dimensional maps of the distribution of product ingredients. A wide variety of Raman images were created which take the researcher well beyond what the eye can see.

This analysis has provided beneficial information for the future optimisation of effective product formulations.

The University of Birmingham has one of the largest concentrations of Chemical Engineering expertise in the UK, with an excellent reputation in learning, teaching and research. Its Chemical Engineering School is within the top five of the country. It combines global experts in their field, together with leading edge facilities and laboratories.

"Working with the researchers at University of Birmingham has been a real benefit to our business and their expertise is invaluable. We look forward to continuing this relationship…." Nick Ainger, Unilever R&D, UK

## Inanovate - Nanotechnology for protein arrays

Inanovate was founded in 2005, leveraging a unique nanoscale surface fabrication technology developed at the Nanoscale Physics Research Laboratory, headed up by Professor Richard Palmer at the University of Birmingham.

This novel approach to surface fabrication enabled breakthroughs in protein micro-array surface technology, culminating in Inanovate's first product, the i-Slide™, the World's premier surface for protein microarray experiments.

The unique nanoscale surface technology, has been integrated with novel protein screening procedures and detection systems to form the basis of a powerful point of care diagnostic systme for early stage cancer, called the i-Screen™.

Inanovate's Managing Director, David Ure, heads up operations in both the US and UK, with industry leading expertise and facilities crossing business, biology, chemistry, physics and nanoscale engineering, providing a unique and powerful base to continue to grow as a leader in clinical and pre-clinical protein biochip systems.

This photo shows Inanovate's properietary nano-particle biochip production system at their UK facility. This system was developed throgh a consortium with Teer Coatings Ltd and the University of Birmingham, and was supported by a UK Technology Strategy Board grant under the prestigious Micro and Nanotechnology (MNT) program.

Inanovate's many achievements to-date include:

- Development of a team that comprises extensive expertise in business, biotechnology, chemistry, diagnostics and nanoscale engineering
- Development of facilities at the cutting edge of nanoscale surface fabrication and protein biochip technology

- Awarded prestigious government grants through the UK's Technology Strategy Board, SMART Cymru and Advantage West Midlands
- Acceptance onto prestigious loan programs through the North Carolina Biotechnology Center
- On-going strong collaborations and strategic partnerships with institutions such as Harvard Medical School, the University of Birmingham, Johnston Matthey, and Teer Coatings
- Ongoing support through private venture financing
- Winning the prestigious Babson Business Plan competition for most promising new business in 2006

For more information please visit the **Inanovate website (www.inanovate.com)** .



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