

A Collaboration into Research on Nanoparticles (ACORN)

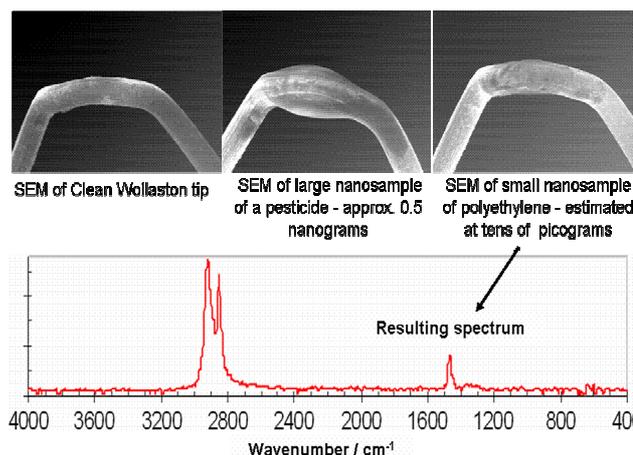
ACORN is one of the largest collaborative research and development programmes undertaken in the UK. Its aim was to link together key UK researchers in order to enhance knowledge transfer for industrial use and societal benefit. Initially funded via a DTI Foresight Link award of £4.2 million, the programme involved ten research groups (from six universities) and 16 companies (including three SMEs). Co-ordinated through Chemistry Innovation, the programme has involved 17 separate projects, mostly at post-doctoral level.

Technology transfer was a major objective of this programme and many successful examples of this have been recorded.

One particular piece of technology developed under ACORN led to the spin out of Anasys Instruments from Loughborough University. This was based on a project that explored the use of AFM probes for a variety of 'nano' measurements.

A key obstacle in the wider use of thermal AFM probes for ultra (nano) fine particles is limited spatial resolution. The project team developed an entirely new thermal probe with spatial resolution at least an order of magnitude better than existing technology (50-100 nm, c.f. ~1 micron previously). The probe was then used for non-contact thermal imaging, local thermal analysis and photothermal FT-IR spectroscopy.

The latter technique gave better spatial resolution than the diffraction limit (~ x3 of previous probes). The commercial instrument developed as a result of this activity is marketed by Anasys Instruments as nano-TA (Nano Thermal Analysis).



The diagram above shows examples of such tips being used successfully to transfer and detect nanograms/picograms of pesticide and polyethylene samples, and the FTIR spectrum of transferred polyethylene

Other examples of technology successfully transferred through the ACORN programme include:

University	Technology Transferred to Industry
Birmingham Manchester	Novel aspects of crystallisation, which are pursued by the collaborating company.
Bristol	Provided options for commercial exploitation of surfactant based fracture fluids.
Leeds	Gave options for improved process design and control of particle morphology.
Loughborough	Helped raw material suppliers develop new commercial nanoparticle dispersions. Further work has demonstrated that small additions of nanoparticles have a positive effect on ceramic properties, giving companies a lower cost option for product improvement.
Newcastle	New inputs have been made to the industrial model of crystal growth, which will have a positive impact on the production process.

ACORN Collaborating Companies:

Anasys Instruments, BNFL, CERAM, Dow Corning, Dupont-Teijin Films, Dynamic Ceramic, Dytech, Huntsman Tioxide, ICI, Uniqema, Ionotec, MEL Chemicals, QinetiQ Nanomaterials, Procter & Gamble, Schlumberger, Syngenta & TA Instruments.

ACORN collaboration delivers multiple successes

In addition to the technology transfer activities, successes of the ACORN programme include:

- > 50 peer reviewed publications
- > 30 Invited presentations
- > £2m in additional funding (>than the EPSRC) grant.
- Global Watch Mission (Nanoparticle Technology) to Russia and Ukraine on behalf of ACORN membership.

The programme continues to be a major success story as a collaborative venture. Post programme funded projects have already exceeded the initial cash grant and it is anticipated that many more projects will be initiated. This is a testament to the 'spirit of collaboration and cooperation' engendered across the ACORN partnership.

At the conclusion of the Programme £60,000 of funds left over from company cash input were re-invested to further develop the collaborative spirit. The funding has been used to provide a series of 'Proof of Principle' projects, facilitated by Chemistry Innovation, which allows companies to work with a service provider to test a concept in order to determine the potential for enhanced project collaboration.

Technical case studies for each of the projects will be posted on the Chemistry Innovation website in due course..