Find solutions to your industrial Science challenges!

Access Science Expertise with Relevance at the Ian Wark Research Institute (The Wark™) University of South Australia

*Do you have industrial scientific challenges that our leading scientific expertise may be able to help solve?*

*Do you need new technology to improve your product line?*

*Do you need materials or devices analysed?*

Contact us to discuss how we may be able to help you.

We would like to invite you to The Wark, at the University of South Australia’s Mawson Lakes Campus. Every Friday between 2-3 pm we will be offering our help with any problem you wish to present. Call it “sharing insights and ideas” if you like.

*Did you know the SA Government has an Innovation Voucher Program valued between $10,000 and $20,000?*
Ask yourself if there was an issue, bottleneck, problem or prohibitive expense which you could limit or even eliminate with the wave of a magic wand, what would it be?

For example, if you want to measure the type of pollutant you have on a surface, we can help you with that. If you want to see your material in 3 dimensions, without breaking it up, we can do that too, even if your material is tiny (measured in microns). We have techniques that can measure the flow of liquids and characterise their behaviour in real world complex systems.

The Wark comprises a select team of multi-disciplinary scientists, including physical chemists, physicists, metallurgists/material scientists, and engineers. We are located at the University of South Australia’s Mawson Lakes Campus, Mawson Lakes, South Australia, just 12 km north of the city (off Main North Road). See map on last page.

We have an established track record of realising improvements with commensurate commercial gains – doing excellent science with relevance. The type of research we are good at can be called interfacial science. It is all about surfaces. The type of surface you find in coatings, metals, particle surfaces, membranes, etc.

The University’s newly built $50M Materials and Minerals Science Building is a purpose built space, designed specifically to nurture and facilitate interaction with industry. We would like to meet with you simply to exchange ideas in relation to your own product, process and/or industry challenges.
Polymer Pipe Degradation:

**Problem** – To monitor the change in surface chemistry, particularly fluorine levels, of polymeric pipelines exposed to high temperature and pressure liquids.

**Technique** – Analysis of the pipe surface before and after exposure using XPS (see 1).

**Outcome** – XPS showed the virgin polymer sample to possess approximately five times more fluorine at the surface compared to the same pipe material exposed to high temperatures and pressures. Furthermore, the surface of the exposed pipe sample possessed additional elements suggesting possible surface contamination issues. This XPS data coupled with thermal analysis, SEM imaging and tensile strength data showed the pipes had become brittle over time.

(1) **X-ray Photoelectron Spectroscopy (XPS)**: is a non-destructive surface sensitive tool used to identify and quantify the elements on the outermost surface (~10nm depth) of materials. The bonding arrangements associated with the identified surface elements can also be investigated.
Case Studies

**Problem** – To qualitatively compare surface coatings on zircon minerals reporting to the wrong fraction in an electrostatic mineral separation process.

**Technique** – Imaging by ToF-SIMS (2) and extraction of surface chemistry information from regions-of-interest.

**Outcome** – By comparing the surface chemistry from a statistically significant amount of particles, ToF-SIMS showed the surface coating on the zircon mineral reporting to the wrong fraction to be high in magnesium. It was recommended that the client search for sources of magnesium entering their treatment process so that it could be eliminated.

![Total ion image and associated elemental maps for mineral system (Scale bar = 100micron)](image)

(2) **Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS):** is an analytical technique used to image and record organic and inorganic mass spectral data of solid materials. It is a highly sensitive technique that provides chemical information regarding elemental, isotopic and molecular structure.

**Minerals:** The high surface sensitivity provided by ToF-SIMS allows only the ‘visible’ surface of mineral particles of interest to be probed, giving an indication of surface chemistry, oxidation level, mineral coatings and collector coverage.
Discoloration of Painted Car Panels:

**Problem** – To determine why car panels in contact with an EPDM rubber seal discoloured.

**Technique** – Solvent extraction and transmission FTIR analysis (3).

**Outcome** – Compared to an alternative EPDM rubber sample, the problem EPDM rubber sample submitted for analysis possessed a large amount of extractable material during solvent extraction. FTIR analysis showed the extracted material to be dioctyl phthalate, a common plasticiser used in EPDM rubber. The dioctyl phthalate plasticiser was identified by matching the measured spectrum on a searchable computer spectral database. The client was informed of the high loading of identified plasticiser and how, over time, such plasticisers can migrate to the surface of the rubber and subsequently mark or discolour any surface that the rubber may be in contact with. Armed with this information, the client was then able to seek an alternative source of appropriate rubber seals.

(3) Fourier Transform Infrared (FTIR) Spectroscopy: is used to scan the infrared range to identify a variety of chemical functional groups, molecular absorbed species and oxidation.
South Australian Government Innovation Voucher program

Did you know the South Australian Government has established the Innovation Voucher Program to foster greater innovation in the manufacturing sector, as well as drive connectivity and collaboration between industry and research sectors? Central to the program is stimulating innovation in small-to-medium enterprises (SMEs) through collaboration with research providers to develop new manufactured products or systems and drive productivity and business profitability. Vouchers with a value between $10,000 and $20,000 will be awarded on a competitive basis to collaborative projects designed to enhance the productivity or industry diversification of SMEs.

Department of Further Education, Employment, Science and Technology

Want to make a booking?

Contact our Institute Manager, Dr Terry Wilks and he will set you up with the team of experts most aligned to your needs.

A chance to pick the brains of our best specialists, without obligation, in an interactive casual setting.

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Information correct at time of printing (May 2013)
CRICOS provider number 00121B