AUSTRALIAN TECHNOLOGY NETWORK OF UNIVERSITIES

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Small solutions to big problems

Five of Australia's leading technology universities have joined with key partners in China to launch a new international research network that aims to examine some of the significant research questions of our time, by using nanoscience and the myriad capabilites it brings.

The Australia-China NanoNetwork is an initiative of **the Australian Technology Network of Universities (ATN)** in partnership with the China based **International Strategic Technology Alliance (ISTA),** a coalition of 24 universities that includes 6 of the top 7 universities in China.

This collaboration between the ATN and ISTA networks will investigate the ways that nanoscience can provide advances in key areas such as the environment, health and energy. It embraces the multicultural, multidisciplinary and holistic approaches that can lead to significant outcomes, particularly around complex issues such as climate change that require a broad approach.

ATN Chair, Professor Ross Milbourne said the research questions that we face in the 21st century are not the kind that will be solved by academics working in isolation.

"Climate change and the new technologies we will need to adapt to its effects; reliable and efficient fresh water supply for communities across the globe; next-generation energy generation that is both environmentally friendly and renewable; the big questions in health – the solutions to these problems are by no means simple and it is through cooperation between researchers from diverse backgrounds that they will be found. "

"The NanoNetwork elevates the ATN's existing collaborative reach to a new level, drawing together researchers from university networks in two countries, greatly expanding the expertise base and giving its activities a healthy international perspective.

"It will take advantage of ATN and ISTA networking and in turn, enable research teams to tackle those research questions of significance and relevance to our national research agenda.

"A key advantage of the Network will be its capacity to bring together researchers with the complementary skills and interests necessary to tackle research questions of substance."

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Establishing long-lasting researcher networks lays down the groundwork for such cooperation. To encourage that goal, Professor Ning Gu and Drs Jianfei Sun and Xin Chen from the Research Centre for Nanoscale Science and Technology at Southeast University, Nanjing are currently visiting ATN universities to undertake 'proof of concept' experiments in water quality and renewable energy.

During their visit, the researchers will also participate in the network's Nanomedicine Workshop, at which Professor Gu, one of the foremost nanoscientists in China in the area of functional Nanoparticles, is the keynote speaker. The workshop is being hosted by UniSA on Thursday 27th August and involves researchers from across Australia. Nanomedicine, the application of nanoscience and nanotechnology in medicine, offers the prospect of remarkable progress in global healthcare and diagnostics.

The network is designed to engage researchers at all stages in their careers, from prominent researchers, to 'emerging' researchers in nanotechnology fields, to PhD students. All of these will have the opportunity to undertake research at multiple partner universities in the other country.

Thus not only will participating researchers be able to pool their resources and intellectual capital to address the 'big' problems, they will also be exposed to culturally different ways of approaching research and make linkages which can only serve them well in their future careers, and indeed as citizens of a global community.

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What is nanotechnology?
Nanotechnology is the study of the control of matter on an atomic and molecular scale. Generally nanotechnology deals with structures of the size 100 nanometres or smaller, around 1/100,000th the diameter of a human hair, and involves generating a new generation of materials or devices within that size. The smallest cellular life-forms, Mycoplasma bacteria, are around 200nm in length.

One nanometre is one billionth, or 10^{-9}, of a metre. To put that scale in another context, the comparative size of a nanometre to a metre is the same as that of a marble to the size of the earth. Or the amount a man's beard grows in the time it takes him to raise the razor to his face.

Nanotechnology has the potential to create many new materials and devices with wide-ranging applications, such as in medicine, electronics, and energy production.

Who is the ATN?
The ATN is a collaborative national group of universities with a strong presence in each mainland State. As a group, the ATN has a significant impact on Australia's development and economy through the numbers of work-ready graduates it produces. It also combines its strengths to deliberately make a significant national contribution that goes well beyond education. The ATN has had an increasing impact on the Australian Government's higher education policy frameworks over the past decade; frequently leads important national debate, and has a well-recognised, pro-active response to the needs of the business sector and industry.

The ATN is committed to outcomes-based research. Its practical results and strategically directed training are increasingly making ATN universities the first choice for students and business. Our ability to develop and maintain supportive regional, national and international relationships means that Government, industry and business regularly choose to partner with the ATN.

Who is ISTA?
The International Strategic Technology Alliance was founded in 1995 and is an international collaboration and partnership platform among 24 renowned tertiary education institutions in fostering applied R&D, technology transfer and commercialisation of technologies. ISTA includes 6 of the top 7 universities in China according to the internationally recognised Academic Ranking of World Universities. It promotes intellectual exchange and cooperation among its members in applied research and downstream commercialization, provides an open platform for the exchange of best practices and enhances the international networking and collaboration of its members.

While ISTA has been active in promoting mutual R&D activities and commercialisation within its members since its inception, this partnership with the ATN represents its first wide-scale international collaboration.

What kind of research will the network undertake?
Involving researchers from all stages in their careers, the network aims to pool expertise to tackle issues of importance for both countries. The network has identified initial research foci on water quality, renewable energy and health diagnostics. A key advantage of the Network will be its capacity to bring together researchers with the complementary skills and interests necessary to tackle research questions of substance. Whilst sometimes these skills are available within one university – more often they are not.

Some initial NanoNetwork projects have been scoped to include:

- the development of new nanomembranes for water separation - for example in desalination plants and water recycling;
- solar energy conversion;
- core-shell nanobioparticles for the removal of contaminants (e.g. bacteria), and the delivery of (for example) cancer therapeutic agents

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