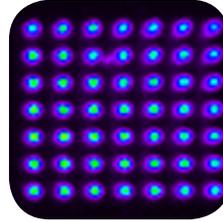




ANFF

Australian National Fabrication Facility Ltd NEWSLETTER

SPRING 2013



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Metamaterial lenses that can see much smaller than light

A lens with ten times the resolution of any current optical lens has been developed at ANFF. It could lead to technology that will allow skin cancer to be diagnosed earlier than current methods, and provide a more accurate check that all traces of a tumour have been removed during cancer surgery.

The metamaterial lens was made at the Optofab Node by drawing an array of metal wires and a polymer into an optical fibre. The team at the University of Sydney demonstrated imaging with the lens to a resolution 1/28 of the wavelength of light.

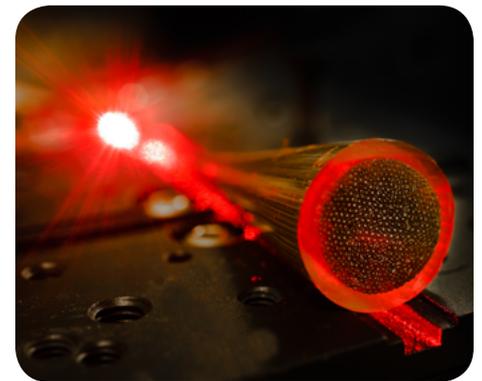
Alessandro Tuniz from the Institute of Photonics and Optical Science (IPOS) at the University of Sydney said: "The lens operates in a terahertz region

of the electromagnetic spectrum with frequencies higher than microwaves but lower than infrared radiation and visible light. At these frequencies a microscope would be able to see through some opaque materials, gather information on their chemical composition, and even information on the interaction between certain molecules.

Within the next two to three years we expect to see new terahertz microscopes that are ten times more powerful than current optical microscopes using our metamaterial, which would be ideally suited to the medical field."

ANFF would like to congratulate the IPOS team on their work, which has led to a publication in the prestigious journal Nature Communications ([link](#)).

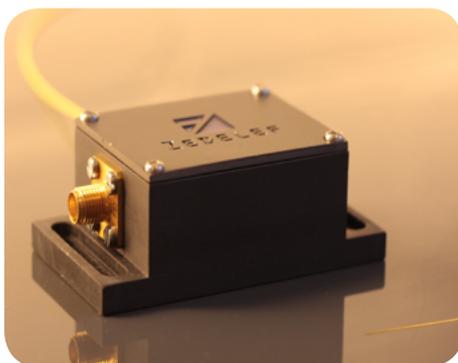
We would also like to congratulate the Institute for Photonics and Advanced Sensing (IPAS), whose work with OptoFab on nanocrystal sensors was also published by the Nature group during Spring ([link](#)).



*A perform of a polymer and array of metal wires before it is drawn into an optic fibre metamaterial lens.
Credit OptoFab Node, University of Sydney.*

ANFF welcomes three new start-up companies

Zedelef, VIMOC Technologies, and Aquahydrex are three startup companies whose R&D operations will be based in ANFF laboratories.



*Zedelef's Optic Fibre Sensor.
Credit: Camelia Tiplea*

Zedelef - Professor Francois Ladouceur and his UNSW colleagues Dr Zourab Brodzeli and Dr Leonardo Silvestri are the founders of Zedelef commercialising a new optical fibre based sensor that could have applications for the oil and gas, and electricity industries.

After securing private investment, a Commercialisation Australia grant and an ARC linkage project with Thales Australia, the team plans to use the NSW Node cleanrooms as a hub for their R&D operations.

VIMOC Technologies - has begun the design of a 3D-integrated computing server-on-a-chip that aims to address the increasing demands of data centres of the future.

During September, VIMOC held a launch of its technology demonstrator [Kaooma.com](#), and has commenced the first stage of its project with ANFF funded by a NSW Government Techvoucher grant.

Aquahydrex - The Materials Node based company aims to develop technologies to efficiently produce fuel using sunlight and water.

Using intellectual property developed at the ARC Centre of Excellence for Electromaterials Science (ACES) and Monash University, the team secured a venture capital investment and commercialisation Australia grant to spin-out the company.

Providing micro and nano fabrication facilities for Australia's researchers

Australian Institute of Nanoscience (AIN) begins construction

"Nanoscience is an element in building our future prosperity. Nanophotonics is already a strength for Australia, and the AIN will increase our capability and build on our successes in quantum computing, memory devices and photovoltaic cells," said Senator The Hon Kim Carr, speaking at a *Breaking-the-Ground* ceremony on the site for the new AIN building at the University of Sydney.

"Nanotechnology is a transformative force for manufacturing and is predicted to be worth \$US3 trillion globally by 2020. Australia needs to stake a claim to our slice of that pie now, by building well-researched prototypes for the market. AIN will help make that happen and keep Australian research internationally competitive."

The \$130 million construction project will include teaching and research space housing state-of-the-art cleanrooms and ANFF facilities, which will be



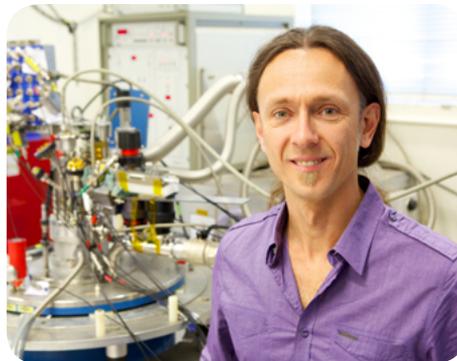
Artists impression of the Australian Institute of Nanoscience building at the University of Sydney.
Credit: University of Sydney

available to all Australian researchers. The federal government contributed \$40 million to the project through the Education Investment Fund.

Around the Nodes

NSW: Associate Professor Andrea Morello has been awarded the 2013 Malcolm McIntosh Prize for Physical Scientist of the Year. It is one of five of the nation's most prestigious and highly regarded awards for excellence in science recognising Andrea's leadership in the development of a silicon quantum computer.

As part of a staff exchange program, the NSW Node hosted Michelle Rincon and Uli Thurmser from the Stanford Nanofabrication Facility.



Associate Professor Andrea Morello,
winner of the 2013 Malcolm McIntosh Prize
Credit: University of NSW

Materials: Associate Professor Peter Innis held an Engineers Australia seminar "Advanced Electroactive Materials Processing" ([link](#)).

ACT: The upgrade of the ion implantation facility at the Australian National University has been completed allowing six inch wafers to be processed.

Victoria: ANFF welcomes Sarah Abramson to the team as Communications Coordinator for the Melbourne Centre for Nanofabrication

QLD: An extension of the ANFF-Q cleanroom at the University of Queensland has been complete and is open to users.

South Australia: ANFF-SA held a short course entitled *Designing lithography masks with AutoCAD*.

Upcoming Events

13-14 NOVEMBER - MELBOURNE
ANFF Annual Research Showcase
National Centre for Synchrotron Science ([More](#))

14 NOVEMBER - SYDNEY
4th Asia-Pacific Symposium on Nanobionics, Materials Node ([More](#))

22 NOVEMBER - SYDNEY
Photonics and Optics: Pivotal Technologies for 21st Century Australia. CUDOS Showcase and ANFF stepper lithography facility launch ([More](#))

27 NOVEMBER - SYDNEY
Optofab Node Launch,
Australian Hearing Hub

2-6 FEBRUARY - ADELAIDE
ICONN 2014 and ANFF Workshop ([More](#))



ANFF

Supporting Research & Innovation

Commercial prototyping, hosting industry R&D operations, and contract research are all services that the ANFF provides beyond supporting cutting edge university research.

Projects can be co-ordinated across the network taking advantage of the \$200 m facility portfolio with support from world leaders in the following fabrication fields:

- Micro and Nano electronics
- Microfluidics and MEMS
- Bio-nano applications
- Advanced materials
- Sensors and medical devices
- Optics and photonics

Innovative projects that have made a real difference to Australia can be found at www.anff.org.au



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Providing micro and nano fabrication facilities for Australia's researchers