ANFF

ACT Node News

THE AUSTRALIAN NATIONAL UNIVERSITY

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ACT Node

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Fabrication capability of ACT Node at UWA fosters major improvements in x-ray imaging

One of the major activities at the UWA facility of the ACT Node being carried out via the ANFF initiative is to deliver packaged prototype hybrid pixel x-ray detector systems for the Collaborative Research Centre for Biomedical Imaging Development (CRC BID) at the Monash Centre for Synchrotron Science (MCSS), Monash University.

CRC BID was formally established in 2006, and the CRC's overarching aim of building linkages between scientific researchers and users of research, such as industry, is shared with the ANFF ideology. The ACT Node at UWA is helping in the development of new and advanced imaging techniques and equipment for application in biomedicine to foster the growth of Australian expertise in biomedical imaging and to build the nation's capacity to serve the needs of researchers, clinicians and industry working in this field.

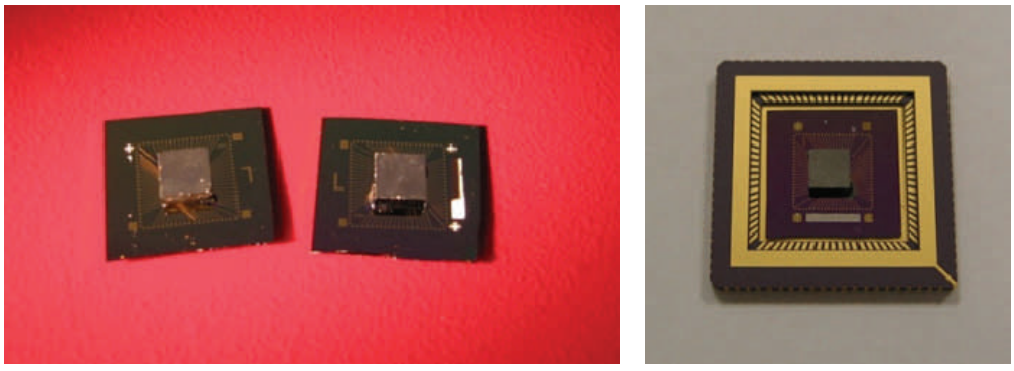
CRC BID is developing a pixel array detector capable of both photon counting and spectroscopy. The core enabling technology is state-of-the-art fabrication that allows high functionality to be implemented in small pixels. This fabrication is performed at the ACT Node - UWA.

A researcher at MCSS working on the CRC BID Detector Stream, Stewart Midgley, said "It was very difficult, and a lot of searching had to be done in order to find someone to perform the fabrication and packaging of the prototype hybrid pixel detectors under development".

Pixel array or photon counting detectors are significantly superior to the integrating methods used in x-ray imaging today, but to date it has proved too difficult to count photons fast enough to generate an image in a reasonable time for clinical diagnosis.

Photon counting detectors typically have less noise than integrated devices and are also able to simultaneously provide the position of photon interaction. The reason that counting detectors are not generally employed for x-ray imaging is that technology limitations result in counting speeds that are not fast enough to enable the recording of a diagnostic image in a clinically reasonable time. Besides fast photon counting, CRC BID is working on the functional design needed for energy resolution.

Such detectors will prospectively allow major improvements in x-ray imaging, including reduced dose image acquisition and tissue as well as disease specific contrast.



First prototypes of hybrid pixel detector arrays (left) as well as the packaged product (right) fabricated at the ACT Node at UWA for Monash University. These devices are leading to the development of x-ray imaging technology capable of x-ray energy resolution. Story and images by Mariusz Martyniuk - ANFF ACT - UWA

Welcome to the first issue of the ANFF ACT Node's newsletter. It is intended that this newsletter be produced on a quarterly basis in the first instance but this will be reviewed as the Node becomes established.

Other news in this issue:

Next Issue: due December 2009

Update on the installation of the FIB and NIL equipment

Summary of the 08/09 Financial and Project Update reports

ACT Node information:

- The ANU facility specialises in III-V compound semi-conductors
- The UWA facility specialises in II-VI compound semi-conductors and MEMs
- We can provide full support with the use of the equipment available
- Pricing policy and rates are available on the ANFF website at www.anff.org.au or contact us for more information - see contact details overleaf

Facility Equipment and Infrastructure Update

Two of the flagship systems, the Electron Beam Lithography (EBL) and Sputter machine are both operational and being widely used. With the EBL machine, lift-off processes have been developed using the resist PMMA 950K. So far feature sizes 1 µm and 500 nm circles are achievable with a resist thickness of 200 nm. For smaller feature size some development work will be required. With the sputtering system a very large variety of materials are available as targets including: Metals - Ag, Al, Au, Co, Cr, Er, Ge, ITO, Mg, Nb, Ni, Pd, Pt, Sn, Te, Ti, TiN; Dielectrics - Al_2O_3, CdO, Er_2O_3, GeO_2, HfO_2, MgO, Si_3N_4, SiO_2, SnO_2, TeO_2, TiO_2, ZnO; Others - AlN, BN, CaF_2, MgF_2, Si, TiW, WSi_2, ZnS, ZnSe.

Furthermore the system offers the possibility of doing co-sputtering from two targets. Also sputtering in O_2 ambient is available allowing to tailor, if required, the refractive index of dielectrics. Recently a lift-off process based on a negative resist (Ma-N 1420) has been developed to be used with the sputter system. If interested contact us for more details.

Installation work is continuing for the dual frequency Plasma Enhanced Chemical Vapour Deposition (PECVD) system, Inductively Coupled Plasma (ICP) and the E-beam/Thermal Evaporator systems. The gas supply facility associated with the clean-room for this equipment is progressing well with the installation of a nitrogen generator that will provide a constant supply of 99.999% pure nitrogen for the dry pumps.

The Focused Ion Beam (FIB) system has been ordered and will be the next major piece of equipment to arrive, and hopefully, installed and functioning by October. Also the Nano Imprint Lithography (NIL) and Hot Embossing systems have been ordered and expected to arrive in October 2009. These are the final pieces of flagship equipment planned for installation and, with all going smoothly, we should have the Node fully operational by year end.

If you would like further information on any of the above equipment, our processing capability, or any questions on how we might be able to assist with your research or product development, there is an initial contact form on the main ANFF website to complete describing your project. This can then be faxed or emailed to us.

Node Director awarded 2009 Australian Laureate Fellowship

In June the ANFF ACT Node's director, Prof. Chennupati Jagadish, was awarded a prestigious Australian Laureate Fellowship.

The fellowships were announced at Parliament House by the Minister for Innovation, Industry, Science and Research Senator Kim Carr. Prof. Jagadish is one of 15 world-leading scholars from Australian and international institutions to be awarded a Laureate Fellowship.

Vice Chancellor of ANU, Professor Ian Chubb said "Professor Jagadish's work has put Australia at the forefront of nanotechnology and optoelectronics research. In addition, he is an inspirational figure to the many students who have studied with him and a leading figure on the world stage in his field."

Story and photo courtesy of ANU News

Staffing and Recruitment Update

All ANU staffing appointments have now been finalised. Dane Kelly was first on deck, being with the project since June 2008 as Technical Officer. Dr Xijun (Gordon) Li commenced in February this year and came from Singapore to take up the position of Processing Engineer specialising in Electron Beam Lithography (EBL). Dr Hoe Tan was able to return to his normal role in Electronic Materials Engineering once Dr Fouad Karouta arrived from Eindhoven University of Technology in The Netherlands in March to take up the position as the new Facility Manager. Fouad has vast experience in the technology of III-V compound semiconductors (GaAs, InP, GaN). With Unity Batenburg leaving late last year, the administrative position was finally filled in April with the appointment of Jeff Kealley. Jeff has been with ANU for just over a year and 'cut his teeth' at the ANU College of Law before taking on his new role of Node Administrator at ANFF. Before moving to Canberra Jeff worked at UWA (our node partner) with the School of Plant Biology. Dr Kaushal Vora, another of our process engineers, arrived in April and hails from La Trobe University in Melbourne. Dr Jie Tian (FIB engineer) arrived from Sweden (KTH Stockholm) on 17 August and Dr Sukanta Debbarma (joint appointment with CUDOS) arrived 3 September.

Res/Prof. Mariusz Martyniuk took up the position of R & D Manager at the UWA facility, back in January 2008 and Mr Nir Zvison (50% funded from ANFF) joined the team as a Senior Technician - Nanotechnology in December 2008 after 9 years with SemiConductor Devices in Israel, providing capable support to Prof. Laurie Faraone and the team at UWA.

A warm welcome to all.

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