

## COMMAD 2014 to be hosted in Perth, WA in December

The next Conference on Optoelectronic and Microelectronic Materials and Devices (COMMAD) will be held at The University of Western Australia (UWA), in Perth, from 14 to 17 December 2014. COMMAD is the premier semiconductor and device materials conference in Australia, and is sponsored by several international organisations. In particular these include the Institute of Electrical & Electronic Engineers (IEEE), through the Western Australian Joint Chapter of the Electron Devices Society (EDS), Solid State Circuits Society (SSCS), and the Photonics Society, which are the premier international technical societies in the fields to be covered by this conference.

COMMAD is held biannually at universities around Australia and has a rich history spanning over 20 years. The aim of COMMAD 2014 is to bring together industrial collaborators, scientists, engineers and students to discuss new and exciting advances in the fields of optoelectronic and micro-



electronic materials and devices, with particular emphasis on advanced materials and various aspects of nanotechnology as they relate to nanophotonics and nanoelectronics.

COMMAD 2014 will provide a forum to present and discuss recent progress in advanced materials growth and synthesis, processing and characterisation, as well as device physics, design, fabrication, testing and applications – and will cover optoelectronic and microelectronic materials including inorganic and organic semiconductors and technologies such as Si, SiGe, SiC, ZnO, GaAs, InP, GaN, ZnSe, HgCdTe, LiNbO<sub>3</sub>, dendrimers, polymers and porphyrins, etc. Also being covered will be

nanophotonic and nanoelectronic structures and devices, such as lasers, modulators, photonic crystals, photodetectors, nanowires, optical switches, photovoltaics, waveguides, quantum dots, HBTs, HEMTs, MISFETs, flat panel displays, plastic electronics, electronic sensors, solar cells, fuel cells, etc.

Fully refereed conference proceedings will be published by the IEEE and a trade exhibition will be held during COMMAD 2014. The conference is expected to attract around 150-180 attendees with approximately 40% attending from overseas institutions. The organising committee has taken into account the relatively high travel costs to Perth and ensured that the registration fee remains affordable, especially for postgraduate research students, as a significant number of postgraduate research students traditionally attend COMMAD. In addition, thanks to the Australian Nanotechnology Network (ANN), attendance by postgraduate research students and early career researchers will be significantly, if not fully, subsidised.

ANFF will sponsor and organise a short course on nano-fabrication technologies. This workshop will assist post-graduate, post-doctoral and early career researchers understand the basic principles of fabrication of semiconductor, optic and photonic devices, and the range of facilities and expertise they have at their disposal through the ANFF network. The workshop will conclude with a tour of the ANFF-WA laboratories at UWA.

For more information please visit <http://mrg.ee.uwa.edu.au/commad2014>.



## ACT Node's New Plasma Assisted Atomic Layer Deposition Tool

The newly acquired PicoSun-Sunale plasma assisted atomic layer deposition tool (PA-ALD) has been in service since April 2014 at the ACT Node. Already five group training sessions have been organised and attracted more than 25 users.

The basic system is configured with four Picosolution 100 sources for the following materials:

- Trimethyl aluminium
- Diethyl zinc
- Titanium tetrachloride
- Deionised water

The latter is intended for deposition of various oxide layers in thermal mode.

Two more sources called PicoHot 200 and PicoSolid are also available. The PicoHot 200 source is actually fitted with Hafnium ethyl-methyl-amide, while two other sources are available for the same precursor: tantalum ethoxide for Ta<sub>2</sub>O<sub>5</sub> and Bis (di-ethyl-amido) silane for SiO<sub>2</sub>. The PicoSolid source is intended for a silver (Ag) source making it possible to deposit multiple layers of pure metallic silver films.

The basic gas for the plasma mode is oxygen, which is injected into the ICP source to produce the required O-radicals responsible of the oxidation process of the metallic mono-layer films. Another important feature of the system is the availability of ammonia, H<sub>2</sub>/N<sub>2</sub> and Ar/N<sub>2</sub>. Ammonia gas enables the deposition of nitride films, either in thermal mode or plasma mode, whereas H<sub>2</sub>/N<sub>2</sub> can be used for plasma-

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PA-ALD training session - 22 April 2014. L-R Michael Gao, Xinjun Liu, Keng Chan, Shuai (Jack) Li, Xin Gai & Kaushal Vora (trainer)

deposited nitride layers. The Ar/N<sub>2</sub> gas is required to deposit metallic silver.

The following layers have so far been tested:

- Aluminium oxide and nitride in thermal and plasma modes
- Zinc oxide in thermal and plasma modes
- Titanium oxide and nitride in thermal and plasma modes
- Hafnium oxide in thermal and plasma modes

The tantalum source will enable the deposition of tantalum oxide and or nitride, whereas the Si source would enable the deposition of plasma-assisted silicon dioxide. Unfortunately, silicon nitride is not possible with this source material.

The Node will soon begin exploring deposition of other layers such as Ta<sub>2</sub>O<sub>5</sub> and SiO<sub>2</sub>. To enhance the system performance and availability it has been decided to acquire a load-lock for the ALD system and a second

PicoHot 200 source (replacing a PicoSolution 100 source) which will give our users more flexibility in choice of the materials for the system, as well as making it possible to deposit a stack of two layers among Ta<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub> or HfO<sub>2</sub>.

Regular meetings will be organised soon with our users to discuss their experiences, and also their future needs and expectations, of the system.

After the system upgrades have been completed such meetings will be used to set a schedule for availability of sources in the system in 3-4 weeks periods.

If you have any questions please do not hesitate to contact Dr Kaushal Vora and/or Dr Fouad Karouta and discuss your needs further.



The new PicoSun-Sunale Plasma Assisted Atomic Layer Deposition tool - shiny!



COMMAD 2014 is on the horizon (see main article)! Our colleagues from the WA Node are busy getting this important conference organised, and the ANFF will be there to promote its capabilities and services again via a short course on nano-fabrication technologies and there

will be a tour of the WA Node facilities for those interested in the work being carried out there. If you are attending this conference, do not miss this opportunity to find out, first hand, all about the capabilities offered by the WA Node and what they can do to assist with your research and development. We hope to see you there.

On a different note, please join us in welcoming our newest ACT Node team member, Jason Stott. After a lengthy recruitment process, Jason was appointed as our new MOCVD Technical Officer later in April and will be working closely with Mykhaylo Lysevych, our MOCVD Process Engineer, who we welcomed in December 2013. Jason moved to Canberra a little over four years ago from the City of Churches, Adelaide, and had been working at the National Science & Technology Centre or, as most would know it, Questacon. With three MOCVD's to attend to I'm sure Jason's Cert. III in Mechanical Engineering will come in handy and he'll be kept busy for quite a while.

We are in the middle of conducting our annual user satisfaction survey - our fifth! We have had an excellent response so far and we'll be accepting submissions up until the end of June 2014. As an added incentive to participate this year we will be giving away a Lenovo A1000 7" Android tablet as well as eight hours machine time to one, randomly selected, lucky respondent. We will analyse the data later in July to see where we are able to improve our services and where we are doing well.

More to come . . . . . (JK).



## LEST WE FORGET

This ANZAC pattern was fabricated by using the Focused Ion Beam (FIB) setup at the ANFF ACT Node by PhD student Evgeny G. Mironov for the commemoration of ANZAC Day 2014.

The structure was milled with accelerated gallium ions which bombarded a 200 nm thick gold film deposited on top of a quartz substrate.

The pattern was created by vectoring the original image and uploading the coordinates of the vertexes to the specially designed patterning script.

The structure is approximately 300 micrometres (µm) square (big enough to see with the naked eye, but too small to see any detail) with the smallest features as small as one micrometre (a pinhead is about 1,000 µm in diameter).

This black-and-white image was taken with the Scanning Electron Microscope (SEM) of our FIB.

## Contact Us

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