Future Compound Semiconductor Manufacturing Hub

Newsletter

April, 2018

For more information take a look at our website: **http://compoundsemiconductorhub.org/**

Come to see us this summer at the Wales Festival of Innovation Compound Semiconductor Day at the CS Cluster in South Wales. Check our website at the end of May for details.

New publications from the CS Hub

We are pleased to report 3 new and exciting publications this quarter:

Electrically Injected Hybrid Organic/Inorganic III-Nitride White Light-Emitting Diodes with Nonradiative Forster Resonance Energy Transfer. S. Ghataora *et al*., ACS Photonics 5, pp 642–647 (2018). Highlighted by eeNEWs Europe (http://www.eenewseurope.com/news/researchers-design-fast-white-light-hybridized-inorganicorganic-led).

Elevated temperature lasing from injection microdisk lasers on silicon. N V Kryzhanovskaya *et al*., Laser Physics Letter, vol. 15, no.1, 015802

High Detectivity and Transparent Few-Layer MoS_2/Glassy-Graphene Heterostructure Photodetectors. Hao Xu *et al*., Adv. Mater. 2018, 30, 1706561

SIOE Conference

The Semiconductor and Integrated Opto-Electronics (SIOE) Conference was successfully held, 27-29th March 2018, with 81 delegates attending. Abstract authors should note that a special issue of IET Optoelectronics will be published to supplement the conference. Authors have until 27th April to submit their papers.
http://compoundsemiconductorhub.org/2018/01/23/iet-optoelectronics-special-issue-semiconductor-integrated-optoelectronics-call-for-papers/

Feasibility Studies in CS Manufacturing Challenges:

Call for Proposals CLOSED: Applicants will be notified of the funding decision in May. We look forwards to welcoming new collaborators to the Hub as part of this initiative.

One day event on Microwave and Millimeter-wave GaN: Wafer to IC

Cardiff University's Centre for High Frequency Engineering would like to invite you to attend this one-day event at Jurys Inn hotel, Cardiff on Wednesday 25th April 2018. Speakers from industry (NASA, Airbus, IQE, NWF), academia (Cardiff, Bristol, Fraunhofer IAF) and other organisations (EPSRC, Compound Semiconductor Catapult) will present their thoughts on the latest developments in GaN research and the future direction for its application. For the latest please go to:
https://www.eventbrite.co.uk/e/microwave-and-millimeter-wave-gan-wafer-to-ic-workshop-tickets-43343519634

1st China-UK workshop on GaN Materials and Devices for Early Career Scientists

The 1st China-UK Early Career Workshop on Wide Band-gap Semiconductor Materials and Devices will be held during 15-16 June 2018, at the University of Sheffield, UK:
http://gancentre.group.shef.ac.uk/workshop/
Registration is now open. Visit the University of Sheffield Online Store to book your place.

LS16: The 16th International Symposium on the Science and Technology of Lighting

The 16th International Symposium on the Science and Technology of Lighting takes place on 17th – 22nd June 2018 in Sheffield, UK.
Paper submission and registration are now open @ www.LS16.org.

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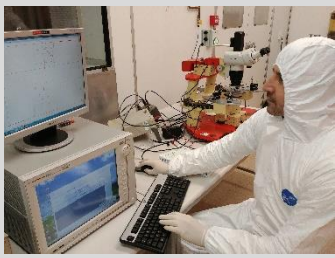
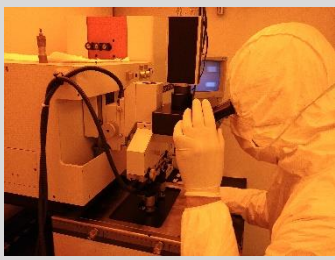
Research Focus: The Fabrication of Electronic, Optoelectronic & Optical Devices

CS Hub Work Package 7, lead by Prof Mo Missous, University of Manchester

Fabrication quality control is an essential element in manufacturing: in the production of any state-of-the-art CS device multiple individual tailored steps are necessary that can involve years of development. Each process requires two key ingredients to ensure a consistent fabrication. Firstly, the laboratory conditions where the devices are produced are strictly monitored, and secondly, the functionality of the devices are continuously evaluated and compared from run to run.

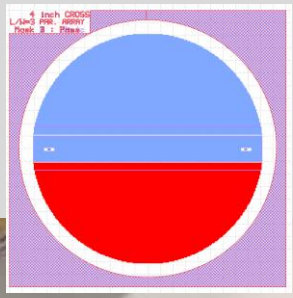


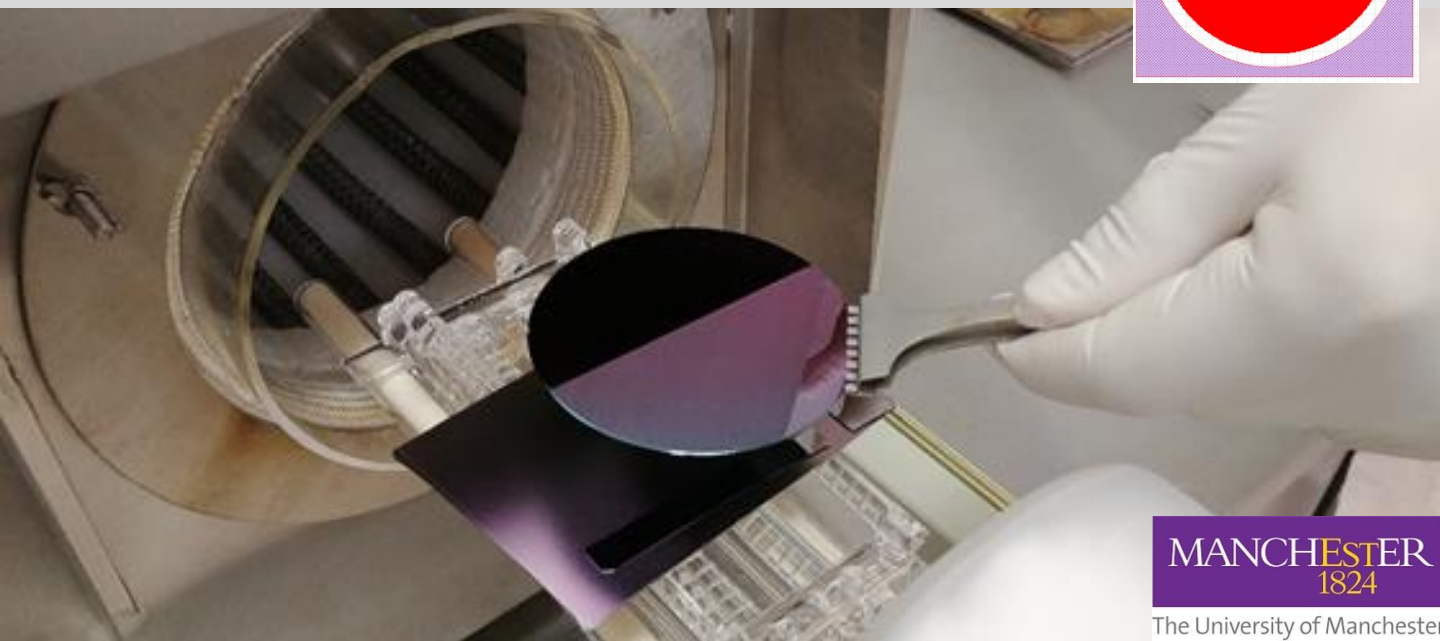


Large scale CS wafer fabrication commences only after successful small scale R&D trials. These are essential to eliminate any fabrication related problems and minimise overall cost per device and maximise returns. The University of Manchester School of Electrical Engineering and electronics has dedicated class 1000 cleanrooms, process tools and test equipment that enable the production of multiple state-of-the-art processes. These laboratories have been operating for over two decades and are have enabled many Research and Development programs into full-wafer process (2, 3 and 4” wafer size).

The CS Hub is underpinning the operation and maintenance of these cleanrooms and testing tools to facilitate the production of full-wafer state-of-the-art devices. The laboratory is equipped with advanced i-line tools that are capable of processing small square tiles for research and development applications or full four-inch wafers for manufacturing. Each process is uniquely defined and may require the use of one or more of these tools which have different operating costs. These include Laurell spinners, Karl Suss MA4 mask aligner, Oxford Instruments Reactive Ion Etcher, Kurt J Lesker PVD-75, Edwards (HHV) Auto 306 evaporators and multiple Agilent (Keysight) DC-IV Semiconductor Parameter analysers.

To date these laboratories have produced multiple high-speed devices including heterojunction bipolar transistors (HBT), Terahertz capable devices (Resonant Tunnelling Diodes), optical devices and magnetic sensors. The scaling up from Research and Development to full-wafer production has been successfully demonstrated for the magnetic sensors programme. The high yielding four-inch process developed provided individual elements for use in the magnetic camera designed at the University of Manchester. Arrays of elements have now also been designed and fabricated which will provide the means to detect domain wall motion at room temperature. If successful, scaling this R&D programme to full-wafer manufacturing will follow the same process route as the discrete magnetic sensors.





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