2nd ASCENT Newsletter – June 2016

ASCENT is building a new community…

ASCENT is steadily building a new community of researchers since it was launched in November 2015. Already we have 137 members from 32 countries and we are encouraging researchers to participate in the programme and access the infrastructure available at the three partner sites; imec (Belgium), CEA-Leti (France) and Tyndall National Institute (Ireland). We recently held our second Users Workshop in parallel with INC12 in Leuven in Belgium.

ASCENT engages directly with researchers through **Workshops** and **Webminars**:

Workshops: We will host 5 Workshops during the ASCENT programme. These Workshops are a great way of meeting directly with researchers and explaining exactly what technology is on offer and how to access the expertise, technology or device data. The feedback has been very positive so far and researchers are delighted with the direct access to the relevant experts in each partner site and the speed of the access process.

The *2nd ASCENT Workshop* was held on 10th May in Leuven, Belgium in parallel with the INC12 conference. The ASCENT Co-ordinator Professor Jim Greer gave an outline of the programme and then experts from Tyndall, imec and Leti explained the technologies they are working on and what infrastructure is available for access. We were delighted that a member of our ASCENT Users Committee could also attend and outline the benefits to the users: Professor George Angelov from the Technical University of Sofia explained how fast and easy the access process is and the high level of support provided before and during the short application process. If you have any questions just contact paul.roseingrave@tyndall.ie and he will help you and put you in contact with our experts.

Webinars: We are planning to host a webinar to engage directly with ASCENT Network Users in the modelling and characterisation community. In the webinar we will give examples of projects that have applied to date and also outline the technology and infrastructure on offer. If you have a team of researchers working on nanoelectronics device modelling or characterisation and would like a direct engagement with us we will happily set up a webinar for you. Contact paul.roseingrave@tyndall.ie to discuss.

This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 654384.

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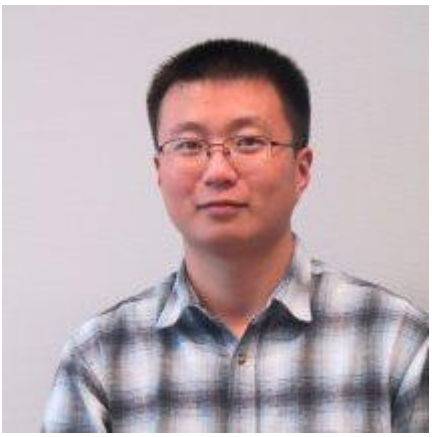
ASCENT's 1st transnational project complete

"Through the ASCENT network I quickly got access to the fabrication facilities and personnel. That helps me gain important data for my research project"

Liang Ye, University of Twente, Netherlands



Title: SOI nanowires for nanowires ultra-shallow doping experiment
Access Type: Remote

Description: This work involved the doping of silicon nanowires using monolayer contact doping (MLCD). MLCD is a modification of the monolayer doping (MLD) technique. It involves monolayer formation of a dopant-containing adsorbate on a separate source substrate that is subsequently brought into contact with the target substrate, upon which the dopant is driven into the target substrate by thermal annealing. The use of a source substrate provides a capping effect which prevents loss of dopants without having to use a capping layer on the target substrate which would require additional chemical removal. This allows easy application of this method on sensitive structures, including Si nanowires. We used here a boron-rich carborane adsorbate to construct the monolayer that delivers the dopant, to boost the doping level in the target substrate. The doping of silicon nanowires that were prepared by the ASCENT project were demonstrated and measurements performed by the ASCENT team proved incorporation of the dopant atoms into the silicon nanowires resulting in improved conductivity.

Monolayer doping (MLD) is an alternative doping technique with increasing interest in recent years. It offers the benefit of producing ultra-shallow doping without causing crystal damage. It is also suitable for doping 3D structures. Recently monolayer contact doping (MLCD) was proposed. MLCD eliminates the wet chemistry processing of the samples while retaining the benefits of MLD. In this work we want to demonstrate the tuning of electrical properties of silicon nanowires using ultra-shallow doping from MLCD. This opens up possibilities for refining nano-structuration and fine-tuning the properties.

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ASCENT provided Si nanowires to investigate the electrical properties of the nanowires in relation to their dimensions (100-200 nm in width and height, few hundred nanometers to few microns in length) and the depth of the doping (10-20 nm range).

Work carried out via ASCENT:

1. Fabrication of nanowires on SOI substrate
2. Electrical characterisation of undoped nanowires
3. Electrical characterisation of nanowires following ultra-shallow doping at user facilities

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Profile: Julie Donnelly

Julie Donnelly is the Programme Manager for the ASCENT programme. Julie has an extensive background in CMOS fabrication and also in managing access programmes at Tyndall. She graduated with a BSc in Physics and Mathematics in 1985 and joined Tyndall (then NMRC) in 1985. She spent the first 15 years of her career in the Silicon Fabrication Facility, first as a process engineer and then was appointed as Silicon Fabrication Manager in 1995. During that time her particular research interests included CMOS metallisation, advanced lithography and process integration.

In 2000 she was appointed as a Technology Manager with responsibility for the interface between the Fabrication Facility and its external commercial customers. As well as a strong focus on commercial work throughout this time Julie was directly involved in many research projects, including coordinating an EU project investigating novel silicon process techniques for wearable applications.

Since 2004 Julie was the Programme Manager for the highly successful National Access Programme (NAP) at Tyndall. NAP enabled researcher access to all the expertise and infrastructure available at Tyndall through funded research projects. Over the next 11 years NAP delivered 350 research projects involving 650 researchers. A key to the success of NAP was a strong and sustained approach to promotion which included over 300 specific events and a dedicated interface team. In keeping with the values of Tyndall's commitment to technical excellence the NAP project outputs included 860 scientific publications and contributions to 90 theses.

Julie is now managing the ASCENT programme. This involves the day-to-day management of the programme to ensure the highest standards of access are delivered to the nanoelectronics research community.

"ASCENT is a fantastic opportunity to use the expertise we developed in running the National Access Programme and apply it a European and even global scale. We have designed the ASCENT programme to directly address the needs of the User and to build a strong spirit of collaboration with all involved. I am really excited to be working with world-leading partners in imec and CEA-Leti and I look forward to delivering excellent access projects through ASCENT".

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