

FLEET News January 2019

FLEET NEWS

We are back from a well-earned break after a very busy 2018. I hope you had a relaxing break too.

This month we congratulate Qialiang Bao at Monash, whose biomarker study in Nature doubled FLEET's media-mentions KPI for the whole year! See below for more about this important work.

In case you missed it, in December we added two more Partner Investigators, expanding our collaborations with Tsinghua University in Beijing. Meet the two new PIs below.

The Operations team has been busily putting together the Centre's second annual report. Thanks to all who have contributed material for this key record of FLEET's mission and accomplishments.

Read on for news from around the Centre.

Regards,

Michael Fuhrer

Director

ARC Centre of Excellence in Future Low-Energy Electronics Technologies

Catch up on previous editions of FLEET News

In this edition:

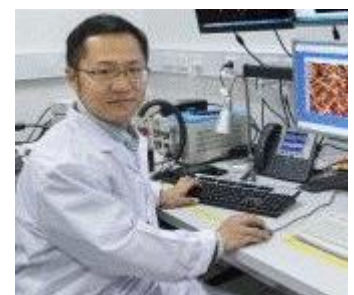
- 2D materials key to earlier cancer detection
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2D materials key to earlier cancer detection

FLEET CI Qiaoliang Bao led a collaboration that has unlocked the door to earlier detection of cancer, with a world-first study identifying a potential new testing method that could save millions of lives.

The team found that a sensor using new, more sensitive materials to look for key markers of disease in the body increased detection by up to 10,000 times. [Read more online.](#)

The story has received significant coverage online, including an interview on [SBS Mandarin](#).



Expanded research partnership with Tsinghua

FLEET's fruitful relationship with Tsinghua University (Beijing) has been expanded, with the Centre welcoming two new Partner Investigators to lead research collaborations:

Prof Shuyun Zhou (shown, right) studies the electronic structure of novel 2D materials and heterostructures and will work with Michael Fuhrer (Monash University) on 2D deposition.



Prof Pu Yu (left) studies emergent phenomena at the interface of correlated electron systems, and his expertise in complex oxides will complement work with Xiaolin Wang (UOW) and Nagy Valanoor (UNSW) on ferroelectrics.

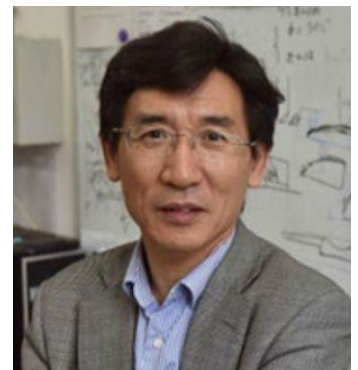
[Read more online.](#)

QHE research recognised: Qikun Xue

Qikun Xue at Tsinghua University (Beijing) has been recognised for discovery of the quantum Hall effect, with potential for ultra-low energy electronics, reducing energy cost and heat emission, with 1st prize in China's Science and Technology Awards

Professor Xue pioneered high quality thin films of topological insulators and first demonstrated the quantum anomalous Hall effect.

Qikun Xue is a FLEET PI and coordinates the collaboration between Tsinghua and FLEET, including a significant exchange program of student and postdoctoral researchers. He also provides critical insights in novel 2D topological insulators in the quantum spin Hall and quantum anomalous Hall phases.



[Read more about the award online.](#)

FLEET2018 annual workshop

Thanks to all who made last year's FLEET annual workshop such a success. Highlights included:

- How to write and pitch a *Nature* paper: ECR development workshop
- Inaugural FLEET trivia
- Talks by international collaborators and partners
- Industrial engagement panel, including a video by CSIRO Chief Scientist Cathy Foley



Future of electronics talk; Melbourne

Three FLEET researchers will describe FLEET research and the background of ICT energy use in a presentation to the Royal Society of Victoria, in March:

- A/Prof Meera Parish (Monash University)
- Rebecca Orrell-Trigg (UNSW/RMIT)
- Dr Carlos Kuhn (Swinburne University of Technology)

If you're in Melbourne, please come along, and help spread the message to family, friends and colleagues. [Details and bookings online.](#)



Images of women in STEM

Australian science needs your help to promote women in science.

The Australian Academy of Science and Australian Academy of Technology and Engineering are seeking photos of Australian women using their STEM skills for the Women in STEM Decadal Plan.



They want a variety of images showcasing diverse careers, teams and workplaces. If you have a photo of yourself, a colleague or your team, [please send it to them here](#) (with permission of the subject, obviously!).



Advanced materials & nanotech conference, NZ

The International Conference on Advanced Materials and Nanotechnology (AMN9) will be held in Wellington NZ in February, hosted by FLEET's frequent collaborators the MacDiarmid Institute.

Michael Fuhrer will be a plenary speaker and FLEET's Agustin Schiffrin, Lan Wang and Karina Hudson are all invited speakers.



Excitonic systems conference, Melbourne 2020

Hot on the heels of ICON-2DMat success, FLEET theme 2 members are now planning a major exciton conference in early 2020, which FLEET will host.

FLEET will be hosting the 10th International Conference on Spontaneous Coherence in Excitonic Systems (ICSC10) in Melbourne 28-31 Jan 2020, co-chaired by Elena Ostrovskaya.

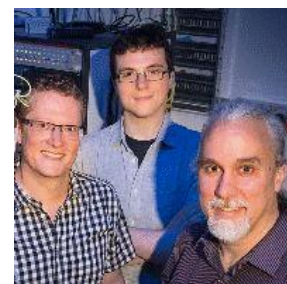
Matt Davis, Tich-Lam Nguyen and Alex Hamilton are on the local organising committee and international program committee.



Previous news

Switching topological insulators off and on FLEET research led from Monash has for the first time successfully 'switched' a topological insulator off and on via application of an electric-field – the first step in creating a functioning topological transistor. The experiment demonstrated:

- for the first time, topological state in a topological insulator switched on and off using an electric field
- possible at room temperature.



Flux capacitor in Australian Physics magazine. FLEET's Jared Cole (RMIT) has written an article about his quantum collaboration (resembling the flux capacitor from *Back to the Future*) for the AIP's magazine. Check it out in the December issue of *Australian Physics*. (If you're not a member, ask to borrow a colleague's copy. Or join up!)

Say cheese: capturing an exciton snapshot at ANU The first ever 'snapshot' of Bose-Einstein condensation was achieved in this FLEET/ANU study, led by Eliezer Estrecho. Previous observations of exciton-polaritons in BECs have been gained by statistical averaging over millions of events.



Describing Nobel-winning science FLEET CI Kris Helmerson (Monash) explained the physics and applications of 'optical tweezers', recognised by the 2018 Nobel Prize in Physics, at a public talk hosted by the Australian Institute of Physics. 50 attendees ranged in age from secondary school to retirees. The AIP Nobel Prize Public Lecture is an annual event run by the AIP's Victorian branch, introducing the public to the physics behind each year's Nobel Prize. **Also read: Nobel-winning physics applied at FLEET.**

ICON-2DMat success FLEET hosted the 4th International Conference on Two-Dimensional Materials and Technologies in Melbourne in December. Around 300 international and Australian delegates enjoyed 6 plenaries, 16 keynote talks, 148 oral presentations and >130 poster presentations. Free, on-site childcare was provided.



Summer School on ferroelectrics FLEET sponsored the Summer School on Ferroelectrics at UNSW, which covered fundamental science and cutting-edge applications, catering for new and experienced researchers and students. The workshop was in-part organised by FLEET Research Fellows Daniel Sando and Peggy Zhang.

Events coming up

- **31 January** FLEET research seminar: Atoms on surfaces, Monash, VIC
- **5-8 February** Condensed matter & materials meeting (“Wagga 2019”), Wagga Wagga, NSW
- **10-14 February** International conference on advanced materials and nanotechnology (AMN9), Wellington NZ
- **14-15 February** GRAPHENEforUS, New York USA
- **19 February** Innovation series: Seminar on commercialising innovation, Australian Synchrotron, VIC
- **13-14 May** International conference on optics, lasers & photonics, Tokyo, Japan

See the [FLEET intranet calendar](#) for more events.

Prizes & opportunities

FameLab is a great opportunity for ECRs to develop their science-communications skills—learning to tell the story of their research in a way that’s compelling and clear: A great skill to have for any scientist, in advance of that legendary “sharing an elevator with the minister of science” moment. The competition gives each scientist 3 minutes on stage to tell their story, with state, national and international “playoffs”. Deadline 15 February.



Pint of Science puts scientists on stage to present their research in a casual pub setting. They're seeking presenters and volunteers to help organise, with events in Melbourne, Sydney, Canberra, Brisbane and Wollongong (20–22 May).



MC^N **The Melbourne Centre of Nanofabrication** and ANFF Victoria are seeking Masters or PhD interns to be partnered with industry clients to work on 2-6 month internship projects.

Australian Nanotechnology Network (ANN) funding for members to travel to Australian National Fabrication Facility nodes. Open for postgraduate nanotech students and ECRs currently studying/working in Australia who are members of ANN.



APR Intern provides internship opportunities within Australia for PhD students at various points in their candidature. See current opportunities online. A current position in Melbourne (generation of a solid model of a cutting tool) indicates skills FLEET affiliates might have, specifically programming, 3D graphics, etc.

Participating organisations

FLEET is: The Australian Research Council Centre of Excellence in Future Low-Energy Electronics Technologies.

Participating nodes are: the Australian National University, Monash University, RMIT University, Swinburne University of Technology, the University of New South Wales, the University of Queensland and the University of Wollongong.

