FLEET ARC CENTRE OF EXCELLENCE IN FUTURE LOW-ENERGY ELECTRONICS TECHNOLOGIES

FLEET News: June 2020

There is no place for racism in science, nor in society. FLEET values the contributions of our diverse members, spanning 27 cultural backgrounds.

However, current global and local discussions are a reminder that we can always do more and do better, and FLEET will take this opportunity to study our own systems, ensuring we are behaving consistently with our commitment to fairness and diversity and looking for ways to be more effective. FLEET is forming a working group to determine what we can do to make a difference.

Diverse teams do better science. By improving our performance with respect to equity and diversity, we are not only doing what's right and fair, we will also be creating a more effective research team.

Congratulations to FLEET CI Kourosh Kalantar-zadeh, recognised last week by the Royal Society of Chemistry, and to Cathy Foley, whose long-standing contributions to Australian science were recognised by the Order of Australia. More on both of these announcements below, plus a wrap-up of research results, upcoming talks, and links to past talks.

Regards,
Michael Fuhrer
FLEET Director

Catch up on previous editions of FLEET News

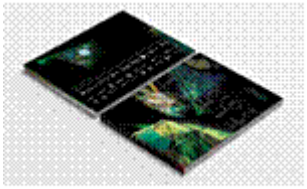
In this edition:

ARC feedback on report

The ARC has praised FLEET's 2019 research efforts, as documented in the Annual Report, in particular singling out FLEET's public outreach results: "The Centre's commitment to 20 outreach hours per member, and particularly the success of its participation in the Sydney Science Festival is commendable".

Australian Government
Australian Research Council

The ARC also noted FLEET's role in leading change within the Australian science community through initiatives such as including partners and families into the Centre's social interactions, including meal and break times during workshops and conferences.



Royal Society recognition for Kourosh

FLEET CI Professor Kourosh Kalantar-zadeh (UNSW) has been awarded the prestigious 2020 Robert Boyle Prize for Analytical Science by The Royal Society of Chemistry: recognised for his significant influence across multiple fields of engineering.

Read more online.

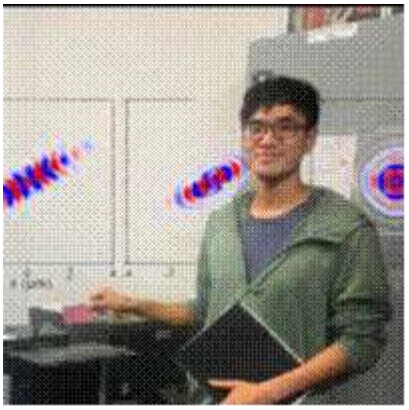
Cathy Foley AO

CSIRO Chief Scientist Dr Cathy Foley was recognised in this year's Queen's Birthday Honours for her distinguished service to research science, to the advancement of women in physics and to professional scientific organisations.

FLEET is very fortunate to have the benefit of Dr Foley's advice on the Centre's Advisory Committee.

Read more online.

Applying 'magic angle' twistronics

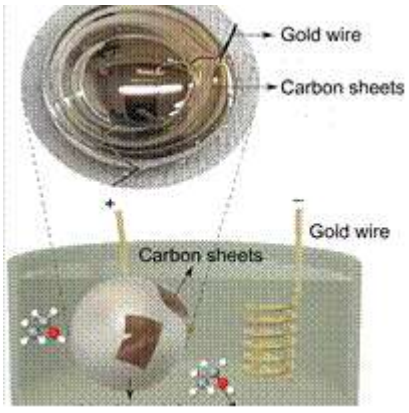


FLEET/Monash researchers are part of an international collaboration applying 'twistronics' concepts (the science of layering and twisting 2D materials to control their electrical properties) to manipulate the flow of light in extreme ways. Published this month in Nature.

Read more online.

We made use of this publication to create a Moire explainer, linking with a recent FLEET homescience experiment on Moire patterns.

Graphitic materials synthesis at UNSW



FLEET's Mohannad Mayyas and team of UNSW/RMIT researchers achieved the first synthesis of ultra-thin graphitic materials at room temperature using organic fuels (eg, basic alcohols). Promising materials for future battery storage, solar cells, touch panels.

Read more about the study online.

FLEET research papers in 2020

Our members have published 38 journal articles already in 2020. Congratulations to those authors!

All FLEET papers are listed on the website. Scan the list and read one or two to see what's happening around the Centre.

Professional skills resources

Developing transferable skills is vital for scientists at all career stages, but most particularly for PhDs and other early-career researchers, to maximise their options inside and outside of academia. A team from across FLEET recently put together this list of resources to improve these skills. (Suggested additions welcome!)

Maintaining connections: Centre-wide, live-streamed seminars

New FLEET AI SUMEET WALIA (RMIT) will lead the next Centre-wide live-streamed seminar, explaining his team's research into 2D and other low-dimensional materials, and how this meshes in with FLEET's research goals.

Future live-streamed talks include Julie Karel (Monash) in September, Priyank Kumar (UNSW) in October and Iolanda Di Bernardo (Monash) in November.

Previous Centre-wide talks have included:

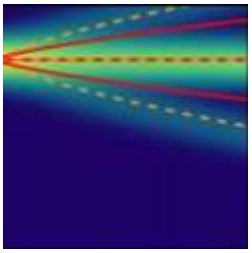
- **Peggy Zhang** (UNSW) covering scanning probe microscopy in the study of material properties
- **FLEET PI Kirrily Rule** on neutron scattering analysis at ANSTO (co-presented by the Australian Institute of Physics)
- **Director Michael Fuhrer's** topological materials talk and COVID Q&A.

Earlier in June, Michael Fuhrer joined a panel of experts to discuss 'What comes after CMOS', co-hosted by the IEEE, with Paolo Gargini, who worked with Gordon Moore at Intel, and has led the semiconductor roadmap and Michelle Simmons (CQC2T/UNSW) on quantum computing. Catchup on youtube.

FLEET PI Kirrily Rule (ANSTO) and Advisor Cathy Foley (CSIRO) joined Michelle Simmons (CQC2T) in a discussion aimed at a general-audience on quantum science breakthroughs and applications in Australia. Catch up on Youtube.

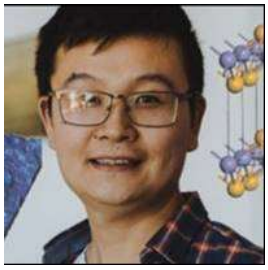
Previous news

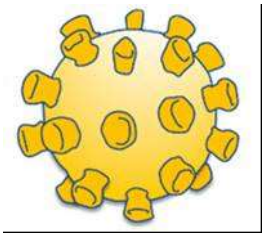
New FLEET CI: Julie Karel It is a great pleasure to announce that Dr Julie Karel (Monash) is now a FLEET Chief Investigator. Julie conducts research at the intersection of materials science and condensed-matter physics, to develop new materials for emerging low-energy nanoelectronic and magneto-electronic devices. Read more about her work online.



What's the fate of a quantum impurity in a BEC? Bernard Field and Meera Parish's (Monash) study of interplay between quantum and thermal fluctuations (excitations) in quantum matter impurity in a BEC finds an intriguing energy spectrum as its temperature is raised above 0K: the number of quasiparticle branches set by the number of hole excitations of thermal cloud. Read more online.

A Superconductivity review A major FLEET collaboration (UOW, Monash, Tsinghua University) reviewing atomically-thin high-temperature superconductors finds that each has a common driving mechanism: interfaces between materials. The enhancement of superconductivity at interfaces in atomically-thin superconductors is a unique tool for discovering new high-temperature superconductors. Read more online.





The COVID-gut link A really interesting new paper in ACS Nano from Kourosh Kalantar-Zadeh (FLEET-UNSW) and colleagues looks at links between COVID-19 and gut microbes, presenting "an urgent need to investigate the possible impact and therapeutic options for COVID-19 based on dietary and microbiome modifications". Read the paper.

Congratulations Maciej Congratulations to FLEET's Maciej Pieczarka (ANU) who has been awarded the START award for young Polish scientists by the Foundation for Polish Science. Read more online.

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.