

# Advanced Technology Institute Newsletter Faculty of Engineering and Physical Sciences

## News

### EPSRC CONCLUDE SUCCESSFUL VISIT TO UNIVERSITY OF SURREY BY VISITING THE ADVANCED TECHNOLOGY INSTITUTE (ATI)



An EPSRC delegation headed by the Deputy Executive Chair Prof. Jonathan Dawes was shown the NanoOPs machine, set up to deliver next generation plastic electronics using imprint technology. This is the same technology used to produce print newspaper, and it is the first of its kind outside the United States. The system demonstrated by the team at the **Advanced Technology Institute (ATI)** showed how

to print electronics on plastic substrates that were flexible, using less energy, costing a fraction of standard semiconductor processing, using much less material (circular economy) and with nanoscale features.

The research shows that it is possible to produce semiconducting integrated circuit technology using simple printing processes for next generation wearable technologies that have its own power supply inbuilt to its fabric. The visit showcased the EPSRC sponsored strategic equipment.

All were impressed with the system that was demonstrated suitable for manufacture and scaling.



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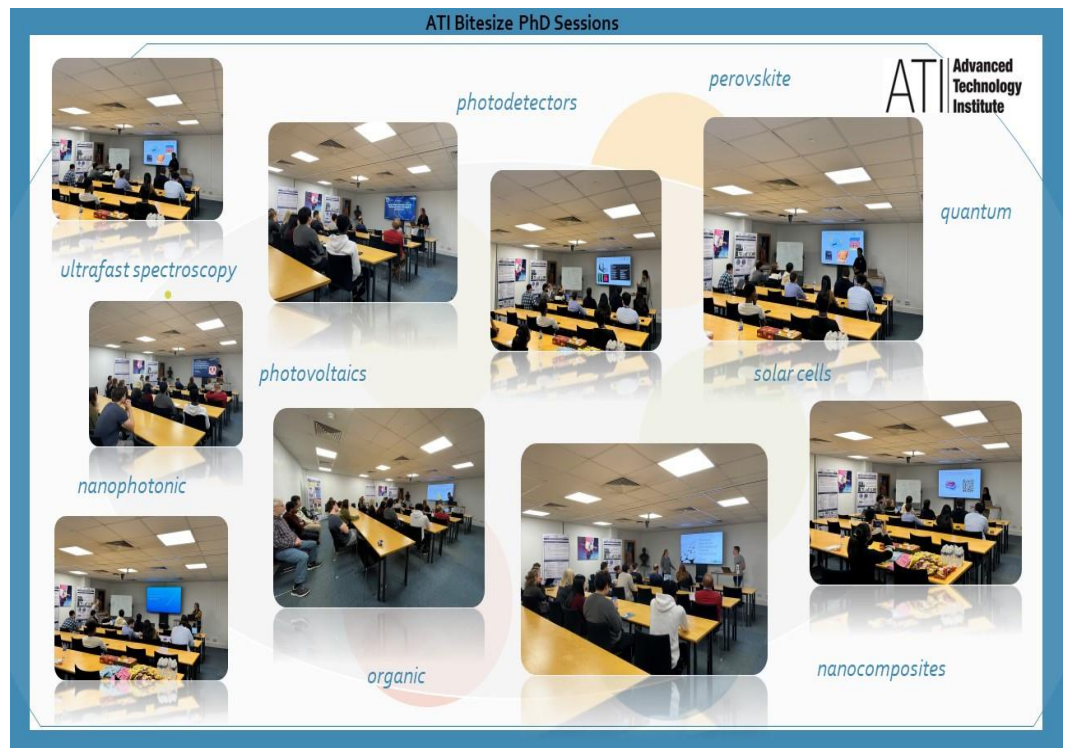


## ATI BITESIZE PHD SESSIONS

The **Advanced Technology Institute (ATI)** PGRs took to the stage, armed with passion and a wealth of knowledge to share, at our recent ATI Bitesize PhD sessions, their interesting research.

Each student presenting their research on a diverse range of topics, each presentation a unique brushstroke on the canvas of academic curiosity. You could feel the genuine enthusiasm.

The audience, a mix of peers and curious minds, were inspired by the infectious energy of these budding researchers. The **ATI Bitesize** sessions are not just a showcase of studies, it's a celebration of intellectual curiosity, resilience, and the future of innovation.



## SELF-POWERING WEARABLE TECH COULD TRANSFORM SPORTS AND HELP EMERGENCY CARE IN REMOTE AREAS

Devices that analyse your gait, plot your location, and measure your pulse without ever needing to be plugged in and re-charged could soon be commercial reality – with possible uses in sports, leisure, and healthcare settings. That is the hope of a team led by the University of Surrey, which has won a place on a UK Government-backed accelerator scheme to find commercial uses for the technology they have developed.



The **TRI-PULSE** project has developed pressure sensors that power themselves by electrostatic induction – using a process like the one that makes your hair stand up when you rub a balloon and hold it to your head.

**Dr Bhaskar Dudem**, Research Fellow at the **Advanced Technology Institute (ATI)** and Entrepreneurial Lead on the **TRI-PULSE** project, said, “We have demonstrated this technology works in the lab – and we cannot wait to explore how it could be adapted for wider commercial use.

Now, the team have until December to explore possible markets for the technology, as part of

the **Innovate UK ICURe** programme – an accelerator programme powered by **Innovate UK**, a government-funded body which supports research enterprise.

## Staff news

**Professor Roger Webb** and **Mrs Karen Arthur** from the **Ion Beam Centre (IBC)** celebrate 40 years' service at the University of Surrey. Congratulations on reaching this amazing milestone! Your hard work and dedication to the University is truly an inspiration.

**ATI** and **IBC** also welcome **Professor Satheesh Krishnamurthy** as the new **IBC** Director.

**Dr Wei Zhang** is celebrated for his recognition for significant and broad influence in his field of research, having written papers among the top 1% most cited in the world, according to the Web of Science™ citation index.

On November 23, the Chinese Academy of Engineering announced the results of the 2023 selection of foreign academicians. A total of 16 foreign academicians of the Chinese Academy of Engineering were elected in this co-option, and **Professor Ravi Silva** was honoured to be among them.

**Dr Muhammad Ahmad** welcomed a baby girl, Fareeha Ahmad, on the 2nd of November. Congratulations, Muhammad.

## PhD News

**ATI** Post graduate researcher, **Hashini Perera**, presented her work at the ICMAT 2023 (11th International Conference on Materials for Advanced Technologies) held at SUNTEC Singapore from 26th - 30th June 2023.

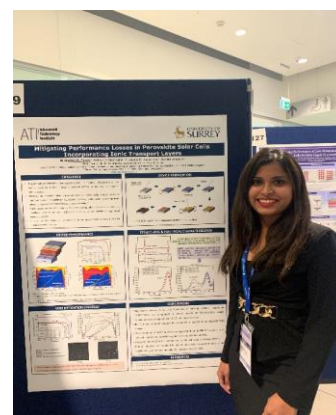


**Surface Modification of Hydrophobic Self-assembled Monolayers for Enhanced Carrier Lifetimes in Perovskite Solar Cells.** This study, which is now published in the journal SolarRRL, focuses on a critical challenge associated with the fabrication of perovskite solar cells on hydrophobic self-assembled monolayers. The paper demonstrates how nanoparticles could be employed in improving the reproducibility as well as the performance of such devices.

(DOI: <https://onlinelibrary.wiley.com/doi/10.1002/solr.202300388>).

**Mitigating Interfacial Losses Through Controlled Crystallization of Lead Halide Perovskites.** In this talk, we provide new insights on the chemical and physical origins of performance losses observed in perovskite solar cells based on a commonly used organic hole transport layer, PEDOT: PSS. We further identify strategies that can be adopted towards mitigating these effects during the processing of these devices.

A SuperSolar sponsored free conference registration was secured to attend PSCO 2023 (6th International Conference on Perovskite Solar Cells and Optoelectronics) held at the Mathematical Institute of Oxford, UK from 18th – 21st September 2023.



These free places for PSCO were offered by SuperSolar for PhD students registered at UK institutions who are SuperSolar Members, on a first-come-first-served basis. Two posters were presented on the topics

- *Nanoparticles for Improved Wettability and Enhanced Carrier Lifetimes of Perovskites on Hydrophobic Self-assembled Monolayers*
- *Mitigating Performance Losses in Perovskite Solar Cells Incorporating Ionic Transport Layers*

## ATI Viva voce examinations in 2023

Our research students who have passed their PhD viva voce examinations in 2023

**Dr Robin Underwood, PhD by Publication** (Supervisor: Prof Marian Florescu)  
Project: An acoustic gas thermometer for the redefinition and realisation of the Kelvin

**Dr Leslie Askew** (Supervisors: Dr Maxim Shkunov, Prof Stephen Sweeney)  
Project: Conjugated semiconductors for a retinal prosthetic

**Dr Dongtao Liu** (Supervisors: Dr Wei Zhang, Prof Jeremy Allam)  
Project: Strain engineering for halide perovskite photovoltaics

**Dr Christopher Preddy** (Supervisors: Prof Ravi Silva, Prof Roger Webb, (Dr Rajinder Singh **QinetiQ**)  
Project: Multi-Functional Carbon Fibre Composites for Radio Frequency Applications

**Dr Jinxin Bi** (Supervisors: Dr Wei Zhang, Dr Yunlong Zhao)  
Project: Fabrication of Photo-rechargeable Systems for Self-powered Electronics

**Dr Michal Delkowski** (Supervisors: Prof Ravi Silva, Dr Jose Anguita (**Airbus**)  
Project: Smart coatings for polymers and carbon fibre reinforced composites to improve properties in extreme environments and space applications

**Dr Alexander Browning** (Supervisors: Prof Jeremy Allam, Prof David Carey)  
Project: Hexagonal boron nitride: Investigations towards a single-photon source

**Dr Adam Burgess** (Supervisors: Prof Marian Florescu, Prof Ben Murdin)  
Project: Non-Markovian Dynamics of Open Quantum Systems in Structured Environments

**Dr Kristian Stockbridge** (Supervisors: Prof Ben Murdin, Prof Steve Clowes)  
Project: Electrical readout of orbital state transitions from few hydrogenic donors in silicon

**Dr Manman Wang** (Supervisors: Dr Yunlong Zhao, Prof Ravi Silva)  
Project: Development of Highly Reversible Li-CO<sub>2</sub> Batteries for Energy Storage and CO<sub>2</sub> Utilisation: From On-Chip Exploration to Practical Application

**Dr Dannielle Cox-Pridmore** (Supervisors: Dr Yunlong Zhao, Prof Ravi Silva, (Dr Fernando Castro **NPL**)  
Project: Embedding bioelectronics within a multifunctional characterisation platform for cellular interrogation and cardiac tissue deterministic regeneration

**Dr Xuhui Yao** (Supervisors: Dr Yunlong Zhao, Prof Ravi Siva)  
Project: Interface Engineering and Advanced Characterisation for Solid-State Li Metal Batteries

**Dr Ella Schneider** (Supervisors: Prof Jonathan England, Prof Ben Murdin)  
Project: Fabrication of Isotopically Pure <sup>28</sup>Si and <sup>74</sup>Ge Layers for Quantum Computers Using Ion Implantation and Metal Induced Layer Exchange

**Dr Max Cykiert** (Supervisors: Dr Eran Ginossar, Dr Carlo Barbieri)  
Project: Robust control of the transmon qubit for quantum information processing

**Dr Jamie McMillan** (Supervisors: Prof Stephen Sweeney, Prof Steve Clowes)  
Project: Traceable thermal imaging in harsh environments

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