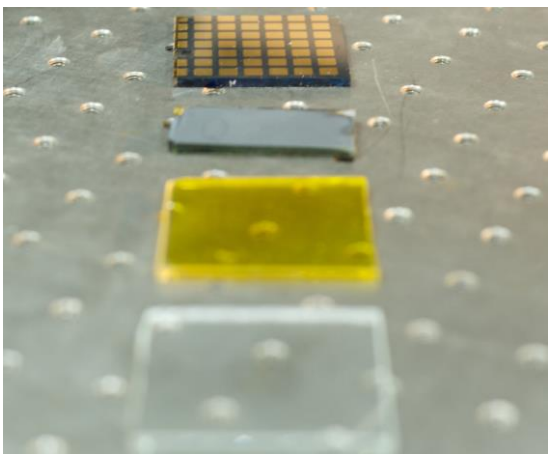
Energy Expertise
// Photovoltaics

Main expertise areas

- A broad range of photovoltaic device technologies: inorganic, organic and emerging technologies
- Developing new sustainable materials for low cost, large area devices for terawatt scale
- Modelling of operation of photovoltaic devices on the nano-scale
- Developing novel approaches: nanostructures and nanoparticle inks
- Grid integration of solar energy
- Modelling of device deployment, systems and integration into society.
- Societal impacts and implications of solar energy.
- Identify financial, political and societal barriers for solar



Different layers making up a thin film solar cell

Background

Solar photovoltaics (PV) is the world's fastest growing renewable energy technology, reaching a global installed capacity of 1 Terra Watt in 2022. Solar research is a core element of the research programme in the Durham Energy Institute (DEI). Durham is widely regarded as a world-leader in PV research. We are working on the key fundamental science that underpins a range of new and emerging PV device technologies right through to their design, manufacturing and successful deployment. The overall objective is to develop new PV materials fabricated at low cost from abundant non-toxic elements at low cost. Alongside this, DEI has researchers looking at societal, economic and political aspects of solar power. This ensures we understand the complex social issues which arise when deploying new technologies. In combination with our world-leading science, this ensures the PV research at Durham is focused on delivering continued success in solar PV energy both in the UK and globally.

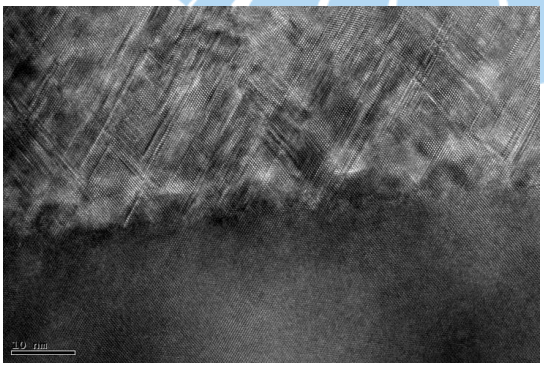
Solar cell device testing and measurement

Durham University
Durham Energy Institute

SCIENCE AND SOCIETY

Recent Projects include:

- Sustainable solar materials, the growth and testing of solar materials based on low-cost earth abundant compounds Cu_2ZnSnS_4 for terawatt applications.
- Thin film II-VI photovoltaic solar cell structures, novel quantum solar cell structures for efficient photovoltaic applications.
- Solar energy transition in Greece, a study of the economics of solar PV in southern Europe.
- Solar car design: Durham University Electric Motorsport, a novel design for solar related technologies to participate in the World Solar Challenge.
- Research into the growth of solar energy and electricity consumption in Bangladesh.
- Offgrid Rwanda, investigated the costs and challenges of providing offgrid (photovoltaic) electricity in Rwanda.



Atomic resolution image of thin film solar cell

Resources

- Materials growth
- Nano-scale modelling of photovoltaic operation
- Solar cell device fabrication, testing, and advanced characterisation and modelling
- Societal and techno-economic approaches to solar energy
- Economic and political contexts for solar energy

Research Team

The Durham University Solar Network consists of a group of 20 academic staff plus postdoctoral researchers and PhD students from across the Durham Energy Institute working in the departments of Anthropology, Chemistry, Engineering, Geography and Physics.

Contact Details:
Durham Energy Institute (DEI)
Durham University
Durham, DH1 3LE, U.K.

Tel: +44 (0)191 334 2649
Email: dei.admin@durham.ac.uk