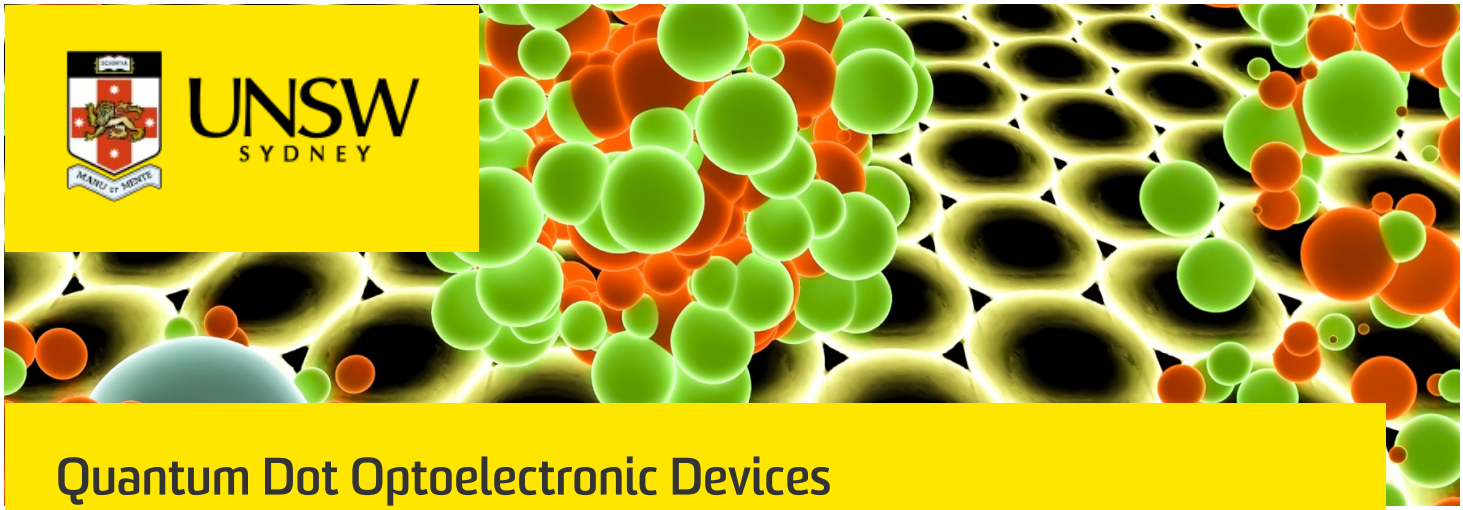

Quantum Dot Optoelectronic Devices

High performance semiconducting devices are synthesised chemically from nanomaterial and quantum dot colloids. These nanomaterials have applications in solar cells, batteries, renewable fuels and luminescent solar concentrators.

Competitive advantage

- World-record semiconducting quantum dot thin film solar cells using PbS and PbSe
- Creation of highly fluorescent non-toxic nanoparticles, Zn:CuInS2
- Vast experience working with and developing:
  - Low cost high efficiency chemically synthesized optoelectronic devices
  - A variety of oxide nanoparticles with good semiconducting properties
  - Tuneable surface chemistries in high performance nanoparticle systems
  - Inorganic Pb-halide perovskite nanoparticles with tuneable fluorescence across the visible spectrum
  - Magnetic nanoparticles, Fe3O4
  - 2D fluorescent and catalytic nanomaterials, MoS2 and WS2

More Information

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Impact

- Enables extraction of energy from light in easily implementable/scalable ways, to harvest energy in unconventional locations, e.g. windows. Improvements in electrochemical energy storage. Efficient energy extraction from biomass-derived cellulose, making inefficient bioethanol obsolete

Successful applications

- World leading quantum dot solar cells in PbS and PbSe
- Highest recorded photoluminescence quantum yield from PbS quantum dots (unpublished)
- Lab-scale luminescent solar concentrators, with good performance
- Improved manganese oxide battery electrodes using doped nanoparticles
- Breakdown of cellulose into value-added products

Capabilities and facilities

- Chemical synthesis laboratory suitable for the fabrication of high performance colloidal quantum dot and nanoparticle synthesis by hydrothermal and ligand-based methods
- Fluorometer to measure photoluminescence efficiency across the visible spectrum and into the infra-red (approx. 400-1500 nm)

Our partners

- ClearVue Pty Ltd, Perth
- Natcore Inc, NY, USA
- Jinko Solar, China