



UNSW
SYDNEY

Silicon Sub-Cells for III-V/Silicon Based Multi-junction Solar Cells

Developing high performance silicon sub-cells for use in III-V/silicon multi-junction solar cells and targeting final efficiencies in excess of the single junction limit of 33 percent.

Competitive advantage

- World-leading expertise in silicon solar cells
- Unique knowledge of Passivated Emitter Rear Local diffusion (PERL) and related silicon solar cell designs and processing requirements
- Expertise in the preparation of silicon structure for III-V growth processes preserving silicon performance
- Patented room temperature contacting technique to simplify processing
- Design and optimisation capability for silicon sub-cells including detailed device modelling, and expertise in additive optical path length enhancement techniques

Impact

- First group to investigate the design requirements for a silicon solar cell with grown III-V material as top junction
- Part of team that holds the current two junction III-V/silicon multi-junction world record for one sun illumination

Successful applications

- Successfully determined robust process for preserving silicon minority carrier lifetimes during III-V growth
- Used modelling and experimental work to determine the key device features to ensure high performance silicon sub-cells
- Produced the first III-V/silicon multi-junction solar cells with optical path length enhancement schemes integrated

Capabilities and facilities

- Full silicon solar cell processing capability including emitter and back surface diffusions, controlled surface texturing and advanced metallisation
- Additive optical path length enhancement techniques developed at UNSW
- Multi-junction solar cell characterisation including spectral response

Our partners

- SolAero, USA

More Information

Associate Professor Stephen Bremner

School of Photovoltaic and Renewable Energy Engineering

T: +61 (0) 2 9385 7890

E: stephen.bremner@unsw.edu.au

UNSW Knowledge Exchange

knowledge.exchange@unsw.edu.au

www.capabilities.unsw.edu.au

+61 (2) 9385 5008