Fact Sheet

United States – Australia
Solar Energy Collaboration – Open Funding Round

AUSTRALIAN SOLAR INSTITUTE



Low cost, high efficiency Copper-Zinc-Tin-Sulphide (CZTS) on silicon multi-junction solar cells

UNIVERSITY OF NSW (UNSW), U.S. NATIONAL RENEWABLE ENERGY LABORATORY (NREL), COLORADO SCHOOL OF MINES

AT A GLANCE

Grant Recipient
University of NSW

ASI Funding
$1.5 million

Total Project Value
$6.7 million

This project aims to develop a new generation of silicon (Si) wafer cell technology, by producing tandem devices that will better UNSW's international record for silicon (Si) wafer-based cell efficiency beyond the world-best 25 per cent value it reached in 2009.

Si wafer based cells account for approximately 90 per cent of the photovoltaic (PV) market and will continue to be dominant in the near future. Any concept that allows higher efficiency and lower cost, as well as being compatible with commercialized Si wafer cell technology, could potentially provide a revolutionary path for the Si wafer based PV. One such option is tandem cells.

This project will involve collaboration with NREL (which holds a similarly leading position with chalcogenide (CIGS/CZTS) cell technology as UNSW does with Si technology) to explore a new approach to combining both technologies to produce a multi-junction Si based cell with the potential to increase energy conversion efficiency by nearly 100 per cent (relative). This project could lead to an initial increase in Si wafer based tandem cell efficiency beyond 30 per cent, with increases above 40 per cent even possible.

The technology demonstrated will be compatible with existing copper indium gallium selenide (CIGS) film-deposition methods, as well as being easily integrated into current Si wafer PV manufacturing.

By producing such a highly efficient and easily adaptable solar cell, this project has the potential to spark a technology revolution within the Si PV industry, accelerating the development of solar energy technologies and ultimately resulting in significantly reduced electricity costs per watt. It would help maintain Australia's leading position in both silicon and CZTS-related cell technology development and commercialisation, as well as provide a path to future generations of much higher performance, lower cost silicon-based solar cells.

"Epitaxial layers of quaternary CZTS related compounds on silicon can combine the advantages of a direct semiconductor with those of the well known and established silicon technology for novel tandem photovoltaic devices, and would be a natural "add-on" to Si wafer based PV."

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