



How to plate copper to both polarities of metal contacts for silicon solar cells

Project Name: [Overcoming the fundamental performance limitations of commercial solar cells](#)

Knowledge Category:	Technical
Knowledge Type:	Technology
Technology Type:	Solar PV
State/Territory:	New South Wales

Key learning

How to plate copper to both polarities of metal contacts for silicon solar cells

The industry standard for light induced plating of contacts for solar cells is limited to the plating of n-type contacts. This has been fine for the industry's present generation of commercial devices where the large majority of solar cells have screen-printed aluminium rear contacts. However, newer higher efficiency technology can benefit from having the option to also plate metal to the positive contact, such as for bifacial solar cells. A new technology was therefore devised, patented and developed in this project that facilitates plating to both polarities of contacts.

Implications for future projects

The new plating technology that can simultaneously plate both polarities opens the option for future projects and technologies to capitalise on these new capabilities. It is also expected to facilitate large-scale manufacturing of some high efficiency technologies that could previously only be implemented through expensive sophisticated laboratory-based processes.

Knowledge gap

Working out how to implement the new technology into a manufacturing tool is of high priority for this technology for its capabilities to be realised commercially.

The opportunity now exists for working out the best way to implement this new technology into a range of existing and future solar cell technologies.

Background

Objectives or project requirements

The project's primary aim was to develop new low cost high efficiency solar cell technology. A particularly important component for achieving this necessitated developing an approach and corresponding equipment that would enable copper to be used as a replacement for expensive silver and that this be based on low cost plating which would enable narrower lines to be formed than

available through standard screen-printing. The achievement of this would contribute greatly to both increasing cell efficiencies but also to reducing costs through eliminating the use of silver. At the commencement of this project, the capability did not exist for being able to carry out this type of plating, such that high performance cells required the use of complicated and expensive processes and materials.

Process undertaken

A new concept for how to plate to p-type contacts was devised in conjunction with industry partner Suntech. The initial experimental development and successful demonstration of the new technology took place at Suntech prior to being transferred to the labs at UNSW for further development and optimisation. The new concept involved using an external electric field for reversing the current flow through the solar compared to its normal direction, therefore forcing electrons to leave the p-type surface, therefore facilitating a reduction reaction that leads to the plating of positively charged metal ions in the solution onto the exposed p-type surface.

Supporting information

Patent Application “Metal Contact Scheme for Solar Cells”, Published US2014/0322860A1, Oct 2014