

# Third-Generation Solar PV Cells Under Development in Australia

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Prototype third-generation solar cells being developed by Australian company Dyesol. (Supplied: Dyesol)

By [Babs McHugh](#)

A collaboration between the CSIRO, the Australian National University (ANU) and a local technology company has come up with a new type of solar photovoltaic (PV) cells that do away with silicon metals and rare earths.

Technology company Dyesol said the new panels have the potential to be a global technology disruptor.

The key to the new technology is perovskite, a material first discovered in the Ural mountains in Russia in the mid-19th century.

Managing director Richard Caldwell said perovskite was a general name for a whole class of compounds that had a chemical lattice structure, which made it particularly good at capturing energy and then converting that energy into a flow of electrons.

Mr Caldwell said this third generation of solar PV was not only for panels, but could literally be embedded in building materials.

“Perhaps things like roofing material, windows, and facades,” he said.

*“So you embed this material at the time of initial manufacture and you have a building which is effectively solar-enabled.”*

“It’s also got some additional functionality which is the generation of electrons, commonly known as electricity.”

There have been other perovskite-based solar photovoltaic cells in the last decade, but these latest ones have a greater ability to convert sunlight into electricity.

And doing away with the need for silicon metals is far more environmentally friendly on its own.

“The production of silicon metals is generally quite heat intensive,” Mr Caldwell said.

“You have to raise the temperature to 1,122 degrees Celsius to refine the material to get it to a level, which means there’s a lot of embedded energy in the existing technologies.

“That goes against the grain because the idea is to produce cheap, clean and green technology that leaves a minimal carbon footprint.”

There are economic benefits too.

“Silicon-based solar PV probably has a payback period of around two and a half years, whereas the payback period [recouping of costs] in these new technologies, including perovskites, is about three to six months,” Mr Caldwell said.

Some of the applications that will be suitable for perovskite-based solar PV are determined by geography.

“Places like Northern Europe, for example, they’re not very suited to silicon metals, so our technology has what’s known as a low-light premium, which means it performs quite well in low light conditions,” Mr Caldwell said.

“Or in areas where they have haze or pollution, silicon depends very much on direct exposure to the sunlight; it’s very dependent on the angle of the sun, and it is relative to the sun itself.

“And countries in Northern Europe, and the UK, are a good place for us to set up our market entry strategy.”

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