Questacon

Sensational Solar Cells

our CLEVER Country

1901-2001 Centenary of Federation

Scientists at the Australian National University have developed technology that reduces the cost of solar cells and will revolutionise solar energy.

WHAT'S THE PROBLEM?

The only energy source that can cope with the increasing demand of humans in the long run is the sun. But before we see solar technologies on a large scale in electricity generation, they will have to become much cheaper. Solar energy systems must compete against non-renewable, environmentally unfriendly, fossil fuels on economic grounds.

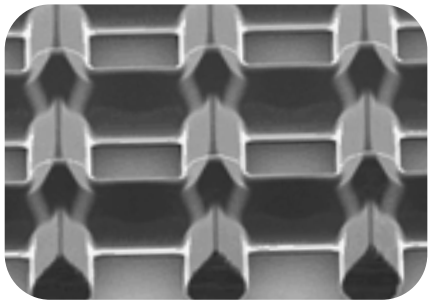
The biggest single cost in solar energy systems is the high quality silicon needed for solar cells. A solar cell, or photovoltaic cell (which basically means 'light energy to electrical energy') contains a thin sheet or wafer of high quality, expensive silicon. The standard method for producing these sheets, which involves slicing up thick pieces, is relatively difficult and wastes a lot of silicon.

▲ **Solar cells in action in the ACT.**

▲ **Coal fuelled power generation is not as friendly but at the moment it is cheaper.**

A GREAT AUSSIE SOLUTION

New technology developed by Australian researchers enables the quick and easy production of super thin (50-150 microns) silicon sheets of all shapes and sizes without any wastage. The process, called Epilift, uses about 10% of the silicon required by traditional methods and therefore greatly reduces the cost of solar cells.



▲ **A finished Epilift layer of silicon, magnified.**

The Epilift process further reduces the cost of solar energy systems by producing wafers of silicon with properties that increase the efficiency of energy conversion.

Epilift silicon wafers have two important properties:

1. they are of the optimal thickness for solar cells; and
2. they have a textured surface which is ideal for trapping light and preventing reflection.

HOW DOES IT WORK?

The epilift process is very similar in concept to the production of instant lawn. After the land is prepared, seed is sown and grass grows. When growth is complete the grass is carefully removed from the ground and transported for use elsewhere. The land is then ready for another growth cycle.

In the epilift process a silicon wafer known as the substrate is equivalent to the ground in the instant grass example above.

1. The substrate is placed in a special solution containing small amounts of pure silicon and an extremely thin layer of silicon 'grows' on top
2. The thin layer of silicon on top is then carefully removed for use in a solar cell
3. The substrate is then ready for another growth cycle

Research team leader Andrew Blakers in the centre with Kylie Catchpole, Klaus Weber and an example of Epilift.

THE FUTURE

The major Australian energy company, Origin Energy (formerly Boral Energy) has committed a budget of $3.6 million to the research and development of Epilift over the three-and-half years from the end of 1998.

For more details contact:

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FURTHER INFO, FACTS & FUN

Solar cells convert light directly into electricity. When light strikes a thin slice of silicon it causes a movement of electrons. Solar cells have no moving parts to wear out and they produce no polluting waste products.

- A micron is one thousandth of a millimeter so at 50-150 microns, Epilift wafers are pretty slim!
- Dr Andrew Blakers has had many firsts in solar energy research. He has held 4 world records in solar cell efficency since 1983.
- The Sydney Olympics Athlete's village is the world's largest ever solar village. The 655 solar house suburb generates enough power to meet its own needs.
- The amount of energy reaching the earth's surface in one hour is enough to satisfy the current world energy consumption! We just have to work out how to put it to use efficiently and cheaply.

For more info on great Australian Science check out:

Questacon's Innovative Australians	http://www.questacon.edu.au/innovaus
CSIRO's Australia Advances	http://www.csiro.au/promos/ozadvances
The Aus' Academy of Science's Nova	http://www.science.org.au/nova

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