

# Aluminium's 30 per cent energy reduction target

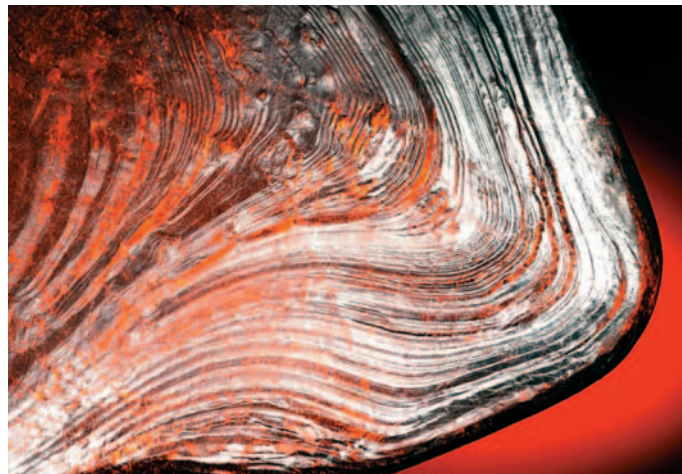
Australian researchers are investigating a new way of making aluminium that could cut the energy required to produce the metal by up to 30 per cent, appreciably reducing greenhouse impacts.

Aluminium production consumes as much as 15 per cent of Australia's electricity, contributing significantly to the nation's greenhouse gas emissions.

Over the past decade, the industry has gone some way towards reducing these emissions from its smelter potlines and improving its energy efficiency. Now, the industry is working with the Light Metals Flagship – a national research program led by CSIRO – to investigate the use of ionic liquids in reducing the very high temperatures needed for aluminium smelting.

Research Project Leader, Dr Theo Rodopoulos, says the key to these liquids is their low melting point.

'Aluminium is currently produced through electro-deposition, where the alumina



Australia is the world's fifth largest producer of aluminium.

Mark Fergus/CSIRO Manufacturing and Materials Technology

is dissolved in a molten cryolite bath at 1000°C and an electric current is applied to separate aluminium from oxygen,' Dr Rodopoulos says.

'By contrast, ionic liquids typically melt below 100°C. If they can be used instead of molten cryolite, they could dramatically reduce a smelter's energy needs.'

The Flagship is working with CSIRO Minerals and mining company Rio Tinto to develop

the liquids for aluminium production.

Rio Tinto's Technology Support General Manager, Dr Ray Shaw, says that the company is monitoring the novel approach closely, and that ionic liquids could reduce the electricity used in aluminium production by 20 to 30 per cent.

'Whether that's achievable or not is uncertain at this early stage, but if there's an opportunity to improve, then

we're interested in exploring it,' Dr Shaw says.

Ionic liquids could also be used as alternative media for reprocessing nuclear fuel and waste in the nuclear power industry, and as catalysts or solvents in a host of other industrial processes.

CSIRO is now exploring their use as electrolytes in lithium batteries, because the organic solvents used in lithium battery manufacture are volatile and flammable. Other potential uses include carbon dioxide recapture in power plants, desulfurisation of fuels and even perfume production.

Dr Rodopoulos believes these unusual liquids have significant commercial potential. They are often called designer solvents because they can be tailored to meet the needs of specific applications.

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## Shower with air to save water

Researchers at CSIRO's Manufacturing and Materials Technology have developed a showerhead that could save up to 20 000 litres of water per year per household.

Fitting onto existing showerheads, the Aerated Showerhead fills the outpouring water with bubbles of air, increasing the volume yet reducing the actual amount of water used.

Project Leader Dr Jie Wu explains, 'We make the water droplets in the stream hollow and the bubbles expand the volume of the shower stream.'

The aeration device is a small nozzle that fits inside a standard showerhead. Using innovative technology in the form of a Venturi tube, which creates a vacuum that sucks in air that is then mixed with



The Aerated Showerhead delivers air-packed water droplets that give the same feeling as a regular shower while saving water volume.

CSIRO Manufacturing and Materials Technology

water, the device has the potential to reduce water consumption by 30 per cent. Across national households, that could amount to enough water to fill 45 000 Olympic-sized pools per year.

Some people might think the quality will not be as good, but testing shows the air shower feels much the same as with a regular showerhead, with no perceived difference in water pressure. The showerhead 'creates the sensation of having a full and steady stream of water even though the water is now more like a wet shell around a bubble of air.'

Dr Wu and his team have worked on the showerhead technology for the past two years and are now ready to proceed to the commercialisation stage.

The Aerated Showerhead is expected to sell for around \$20 and will be easy for anyone to install.