ARC Centre of Excellence for Electromaterials Science | UNIVERSITY OF WOLLONGONG

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Electromaterials live on in the Gong

Shortly after arriving in Wollongong, I took a wrong turn and ended up in Electrolytic St. As an electromaterials researcher, imagine my excitement! Not everyone has an Electrolytic St in their town.

It is in Electrolytic St that you get the sense of awe the Port Kembla stack commands. Completed in 1965, standing 198 metres high, composed of some 220,000 bricks and 9,800 tons of concrete. "The stack" dwarfs the original, small brother, built in 1908 to convey "clean" gases produced throughout the electrolytic process for making copper off into the atmosphere.

The electrolytic process involves smelting to create low purity electrodes (anodes) from ore. Electrolysis is used to strip the metals from that electrode and selectively deposit them on another electrode (the cathode) to obtain high purity copper. Large copper plates are then removed and shipped to be formed into useful structures.

The electrolytic process delivers high purity copper and other precious metals such as gold and silver also recovered as by-products.

Copper remains a critical material in society commonly used in electrical wiring, in electronic interconnects for many devices and in electric monitors. Nanostructured copper has recently been used on the basis of new catalysts for splitting of water to produce Oz (Wiley @ Duke University).

The latter is an example of next generation Electromaterials.

Over recent decades other nanostructured Electromaterials have emerged and Wollongong is at the forefront of global research in this area through the leadership of the ARC Centre of Excellence in Electromaterials Science.

Recent developments include nanostructured carbons (inc graphene), metal oxides and conducting polymers. Such material developments underpin our ability to convert energy (e.g. solar to electrical, thermal to electrical) and to store it (batteries and capacitors). These same materials find use in medical bionic enabling advances in cochlear implants and regenerative bionic devices for nerve, muscle and bone regrowth.

The nanostructured electromaterials mentioned above are all amenable to versatile fabrication approaches that utilise 2D and 3D printing. The ACES node here in Wollongong (in partnership with the Australian National Fabrication Facility (ANFF)) is a world leader in 3D printing of electromaterial structures and devices.

Australian Government
Australian Research Council

Coincidentally in the month the stack will come down we are printing our first 3D structures based on COPPER here in the Gong !

The expertise and facilities established in Wollongong have attracted the attention of global investors keen to establish new manufacturing businesses.

For example, ACES has developed new electromaterial systems for splitting water, with and without the use of sunlight. The technologies involve novel catalytic processes that enhance the efficient electrolysis of water to produce hydrogen. A second set of technologies are inspired by photosynthesis to assist the production of oxygen gas from water under sunlight.

The ARC Centre of Excellence for Electromaterials Science (ACES) is now working alongside newly formed spin-out company AquaHydrex to provide a fundamental research program that will ensure the venture remains at the cutting edge and is commercially successful for years to come.

True North Venture Partners leads a $300-million venture capital fund that seeks to identify disruptive innovations and work with management teams to build companies for the long-term in the areas of energy, water, waste, and agriculture.

There is much more to come. As we continue to build our expertise and facilities we are attracting to Australia high level research talent. We at ACES provide world class training and mentoring facilities to build technical skills and to foster engagement with the commercial sector. We are confident this strategy will see new manufacturing opportunities for Australia and for the Illawarra.

Personally I will be sad to see the stack disappear from the Illawarra skyscape.

I do admire it every morning as I canter along the foreshore.

In compensation I have requested a 3D printed version to be created as a momento and it will of course be printed in copper.

It will take pride of place in my office as I recount to future electromaterial manufacturers the pioneers that went before us forging opportunities for the Illawarra.

By Professor Gordon Wallace
ARC Laureate Fellow & Executive Research Director - ARC Centre of Excellence for Electromaterials Science

ENDS

Professor Gordon Wallace will join Nick Rheinberger from 8.30am Friday Feb 20 on 97.3 ABC Illawarra, live from Port Kembla during the demolition of the stack.

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