Hydrogen From Chocolate!

by Karen Hall
VP, Technology, NHA

Who says you can't have it all? Researchers at the University of Birmingham's School of Biosciences have found a way to combine three of my favourite passions – hydrogen, chocolate, and old cars.

The waste was supplied by Birmingham-based international confectionery and beverage company Cadbury Schweppes plc, a partner in the initiative.

Wastewater used in the manufacture of chocolate is normally discarded, and ends up in a landfill. But the Birmingham Researchers, Professor Macaskie and Dr David Penfold, have successfully found an efficient way to convert this chocolate wastewater to hydrogen. This hydrogen can then be fed into a fuel cell to meet a portion of the energy needs for the factory. This was demonstrated by using a small fuel cell to power a fan from the hydrogen produced in a fermenter.

Hydrogen from confectionery waste in a demonstration reactor passes via a glass 'trap' to a fuel cell which produces enough power to drive an electric fan.

But it doesn't end there. The University of Birmingham team then uses the bacteria on a production line to recover palladium from the catalytic converters of old cars. The same microbial hydrogenase enzyme used to produce the hydrogen from chocolate waste is added to a vat with hydrogen and liquid waste from spent converters. This generates electrons that force the palladium out of solution. The palladium-coated bacteria are then able to be recycled as catalysts for other projects. This phase of the project was aimed at identifying ways of removing pollutants such as chromium (VI) and polychlorinated biphenyls (PCBs) from the environment.

By coupling synthetic and catabolic hydrogenase activities, the researchers have shown that it is possible to co-treat wastes from the food industry, using the bio-hydrogen to treat precious metal waste solutions, producing a new class of bioinorganic catalyst. This can then be used in the treatment of a third or fourth waste, providing the possibility to co-treat several classes of wastes from several industrial sectors simultaneously.

You can read more about it, and see a 4.5 minute video at www.research-tv.com/stories/technology/chocolate.

NHA Welcomes New Members

by Rex Hazelton, Membership Coordinator, NHA

Nuvera Fuel Cells

Nuvera produces hydrogen through steam reformation, partial oxidation reformation, and autothermal reformation of hydrocarbon liquid and other renewable fuels.

The hydrogen is then used in its fuel cells for: automotive applications (Andromeda™ and Star™), industrial vehicle and equipment applications (PowerFlow™, Forza™ and PowerTap™), and combined heat and power generation applications (Avanti™).

Swagelok Company

Swagelok manufactures and supplies peripheral components that are crucial to any high pressure fluid flow systems. Peripheral components include high pressure and corrosion resistant tube fittings, tubing fillers, sensors, gauges and a variety of valves.

Angstrom Power

Angstrom power develops micro-sized fuel cells for use in hand held applications such as flashlights. Angstrom power's fuel cell technology can readily be configured for either cylindrical or prismatic shaped packaging and scaled up for larger applications. Angstrom Power also develops portable metal hydride fuel storage systems (P1 Refueling Cartridges) that could deliver 700Whr/L energy volume or on site hydrogen storage (R1 portable Refueling Station) as well as their own fuel cell charging systems (G2 Fuel Cell Charger).

General Hydrogen

General Hydrogen specializes in integrating different technologies such as Maxwell Ultra-capacitors, Ballard Fuel Cells and General Hydrogen's own proprietary controller and fluid management system in compact fuel cell systems. They also design the fueling system for their fuel cells which includes hydrogen dispensers, hydrogen fuel packs and an Intelligent Fueling System.