Murdoch’s green wastewater machine

Researchers at Murdoch University’s Faculty of Sustainable, Environmental and Life Sciences are developing cutting edge bioelectrochemical systems that turn wastewater into electricity.

Bioelectrochemical systems (BESs) – which include microbial fuel cells (MFCs) and microbial electrolysis cells (MECs) – offer a new way of treating wastewater and recovering useful energy such as electrical power, without the high levels of greenhouse gas emissions produced by conventional forms of wastewater treatment and electricity generation.

Murdoch’s Professor Goen Ho, Dr Ralf Cord-Ruwisch and PhD student Ka Yu Cheng recently patented a new, more efficient BES, known as a rotatable bioelectrochemical contactor (RBEC).

Conventional rotating biological contactors (RBCs) are a type of secondary treatment process used in the treatment of wastewater following primary treatment (usually filtration and settling). A rotating shaft carrying discs with biofilms allows the wastewater to come into contact with microorganisms and provides aeration, resulting in biological degradation of the pollutants.

While RBCs have been used by the wastewater treatment industry for 30 years, the more advanced RBEC increases the efficiency of the process by more than 15 per cent.

Professor Ho says: ‘Just by doing something simple you can increase the efficiency without using any more power’.

The RBEC system works by using bacteria to catalyse either an anodic or cathodic reaction at a conductive electrode surface. The electron flow involved in this process can be directly recovered as electricity when the RBEC is operated as a MFC.

The system is also the first of its kind.

Mr Cheng says the RBEC project is truly interdisciplinary, involving not only biotechnology, but electrochemistry and material science.

With onset of the global energy and water crisis, Mr Cheng hopes to become more involved in research and development of clean technology and bioelectricity.

‘It is not possible to transform today’s use of fossil fuels overnight,’ he says. ‘It’s a long-term process that will certainly involve our future generations.

‘The most important thing is to change our mindset and think of better ways to manage our existing bioresources for renewable energy – BES is not the only solution. We should continue to keep our minds open.’

Laura Gitious

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