Full details

All details held on the selected case study are shown below.

Went live on	Title	Reference
14 Sep 2010	New 'nano-toxin' sensor for continuous monitoring licensed to Modern Water	SID0293

Synopsis

A miniature 'mimic membrane' on a chip, that detects dissolved pollutants down to the nano-scale, has been licensed to a UK-based company specialising in protecting water supplies and in water and wastewater treatment.

Description

Modern Water plc has agreed the licensing rights to an online (ie continuously monitoring) nanotoxicity sensor developed by Professor Andrew Nelson and colleagues at the University of Leeds. The sensor detects dissolved pollutants that interact with biological membranes, including nanoparticles. It also uses nano-scale techniques in its operation.

Modern Water, a UK company, uses new technologies to tackle the problems of water scarcity and waste treatment worldwide. Its wholly-owned subsidiary, Cymtox, already markets a bacteria-based continuous toxicity monitor to protect water supplies against accidental or deliberate contamination.

Nicki Randles, CEO of Cymtox , says: "We've licensed this technology for its broad potential in toxicity monitoring. Measuring toxicity is increasingly important to protect water supplies and to assure the safety of new materials, including nanoparticles, that may be getting into water environments. Andrew's technology should provide a relatively low cost 'broad band' test for water and new materials development. We don't know of any other solid state sensor that can distinguish toxic from non-toxic contaminants in this way"

The sensor uses a phospholipid layer assembled on a chip-based miniature mercury-on-platinum electrode. Toxins that interact with this 'mimic' of biological membranes generate a signal, providing an instant alert.

Nanoparticles (particles in the region of a billionth of a metre across) are already routinely used in clothes, sunscreens, cleaning agents and even toothpaste. Yet their fate and activity in the environment is poorly understood.

Professor Nelson's approach is based on tested technology, but the ability to monitor continuously at this

scale is new - and should prove very useful. Randles adds: "Nanoparticles are a subset of the chemicals we want to look at. And since their fate in the environment and impact on health is so poorly understood it is a very good thing that such techniques are being developed. It's too early to know the work's full commercial potential, but the likelihood is that it will be high and that this research will lead to a commercially-available low cost water toxicity monitor that may detect nanoparticles at low concentrations"

Because the device is so sensitive and so small, it also offers new opportunities to several other industries. For example the sensor may prove useful to the pharmaceutical industry in measuring the membrane activity of new drugs.

These advances have emerged from Professor Nelson's long-term NERC-supported work into the structure of biological membranes, including work at the Plymouth Marine Laboratory. His research has won subsequent support through the Royal Society's Brian Mercer Award (in 2008).

The sensor is also at the heart of a recently funded European Union FP7 project, ENNSATOX, co-ordinated by Professor Nelson. The project will measure the toxicity of groups of nanoparticles in order to build up comprehensive risk assessments.

The research was supported by NERC's Environmental Nanoscience Initiative.

References and links	
Hyperlinks	1. YouTube - Royal Society Brian Mercer Award for Innovation 2008 (nanotechnology) - Dr Nelson

Impacts	
Actual impacts	Industry
Impact evidence	Nicki Randles, CEO of Cymtox, says "It's too early to know the work's full commercial potential, but the likelihood is that it will be high and that this research will lead to a commercially-available low cost water toxicity monitor that may detect nanoparticles at low concentrations" Because the device is so sensitive and so small, it also offers new opportunities to several other industries. For example the sensor may prove useful to the pharmaceutical industry in measuring the membrane-activity of new drugs. The sensor is also at the heart of a recently funded European Union FP7 project, ENNSATOX, to measure the toxicity of groups of nanoparticles in order to build up comprehensive risk assessments.

Research and funding	
Funding type	Research Programme

Researchers at Universities		
Grant reference	NE/F011830/1	
Investigator	Dr LA Nelson	University of Leeds, Centre for Molecular Nanoscience
Co-investigator	Dr DG Adams	University of Leeds, Inst of Integrative & Comparative Biolog
Co-investigator	Dr SJ Milne	University of Leeds, Institute of Materials Research
Classification		
Science themes	Environment, pollution and human health, Technologies	
Science areas	Freshwater	
Policy areas	Environmental technology, Pollution, Water	
Keywords	Health, Nanoscience, Technology, Toxicity monitoring., Water	

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This page last updated: 18 Apr 2012