

Autonomous Nutrient Detection For Water Quality Monitoring

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INTRODUCTION

- The ever increasing demand for real time environmental monitoring is currently being driven by strong legislative and societal drivers [1]
- Low cost autonomous environmental monitoring systems are required to meet this demand as current monitoring solutions are insufficient
- This poster presents an autonomous nutrient analyser platform for water quality monitoring
- Results from a field trial of the nutrient analyser are reported along with current work to expand the range of water quality targets



ANALYSER DESIGN

- The nutrient analyser is a compact and portable unit, capable of autonomously performing wet chemistry in remote locations [2]
- The analyser automatically acquires and filters a water sample, mixes it with a reagent in a microfluidic chip, detects the colour formed after a reaction period and communicates the resulting data back to the user
- The use of microfluidic technology minimises reagent and battery usage and maximises deployment lifetime



Microfluidic analyser for phosphate monitoring in water; (1) Sample inlet; (2) Control board and microfluidic chip (insert); (3) Peristaltic pumps; (4) Reagent bags; (5) IP68 enclosure

References

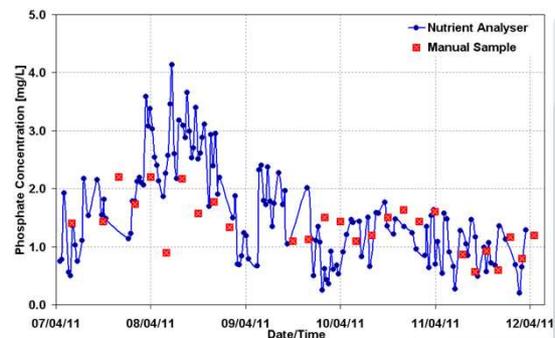
- [1] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Official Journal of the European Union, 2000, OJ L 327.
[2] F. Collins, D. Orpen, D. Maher, J. Cleary, C. Fay and D. Diamond, 'Distributed Chemical Sensor Networks for Environmental Sensing', The Second International Conference on Sensor Device Technologies and Applications (SENSORDEVICES 2011), Nice, France, August 2011.

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IN-SITU MONITORING



Phosphate monitoring in a meat processing plant discharge stream (L) and at a waste water treatment plant (R).



Results showing phosphate levels measured in a waste water treatment plant effluent outflow over a 5 day period. The manual samples, shown alongside the nutrient analyser data, were collected using an autosampler and analysed in the laboratory.

CURRENT WORK



TellLabs Aqua Monitrix System (Targets: Nitrate, Nitrite, pH, Chemical Oxygen Demand)

- Current work is focused on the development of a new analyser system to expand the range of nutrient targets and to monitor other water quality parameters
- The Aqua Monitrix system currently under development in collaboration with T.E. Laboratories (Co. Carlow, Ireland) will provide autonomous monitoring of a range of water quality parameters in both natural waters and at waste water treatment plants