

SUMMARY OF FINDINGS

STRIVE Report No. 36

Analytical Devices for Autonomous Monitoring of the Environment

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This project was organised into three sub-projects:

1. Development of an autonomous phosphate analyser for measuring nutrient levels in rivers, lakes and coastal regions;
 2. Development of methods for rapidly quantifying the elemental (mainly heavy metal) content of soils and dust samples.
 3. Development of new low cost, low power sensors that have potential for long-term deployment in the field. The project was funded by the Environmental Protection Agency (EPA).
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Background

The research of this project covers the development and application of a wide range of environmental sensing techniques and their adaptation to in-field analysis for a variety of environmental samples.

Key Points

- The project involved the development of prototypes for long-term autonomous monitoring, and the development of novel sensing technologies that could significantly reduce the expenses of deployable sensing devices for rapid *in-situ* detection of pollutants.
- A real-time water quality monitoring technology was showcased by developing the portable phosphate analyser. This device demonstrates the potential of

automated and fully autonomous long-term analysis of phosphate in environmental samples based on a microfluidic platform. The analyser is fully equipped for long term monitoring and was field tested at a number of river locations in Ireland.

- A fast and reliable analytical methodology was developed using X-ray fluorescence (XRF) that could be employed to provide rapid *in situ* detection of the presence of toxic metals such as Pb, As, Cu, and Zn in soil.
- Hereby developed optical detector based on LEDs as both light sources and light detectors has excellent potential for use in numerous analytical applications due to its low cost and excellent analytical performance.
- This project has evaluated the potential of using simple and low cost potentiometric sensors as early warning systems in monitoring of heavy metal pollution of water and soil.

Concluding Remarks

The areas covered in this project continue to be very active research topics for the Adaptive Sensors Group (ASG). For updated information about this, and other research ongoing within the ASG, please visit our website at www.dcu.ie/chemistry/asg/. Our work in the CLARITY CSET can be accessed via www.clarity-centre.org/

For Further Information

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The report *Analytical Devices for Autonomous Monitoring of the Environment* by Tanja Radu *et al.* is published by the Environmental Protection Agency and is available from: http://www.epa.ie/downloads/pubs/research/tech/STRIVE_36_Radu_AutonomousMonitoring_web.pdf