

AUTONOMOUS MONITORING SYSTEM FOR QUANTIFICATION OF HEAVY METAL IONS IN WATER

INL has developed an autonomous monitoring system for the precise quantification of heavy metal ions in water. The device is designed to collect and process samples automatically, perform electrochemical analysis using carbon-modified transducers, and report metal concentrations with minimal operator input.

The system has been deployed under real operating conditions at an industrial wastewater facility, where it was validated against the reference method – inductively coupled plasma optical emission spectroscopy (ICP-OES). Integrated into an Internet of Things (IoT) network, it delivers real-time data to plant control systems, supporting automated monitoring and optimisation of water treatment processes. This platform provides precise information about heavy metal concentrations, crucial for process control and regulatory compliance.

+ Suggested applications

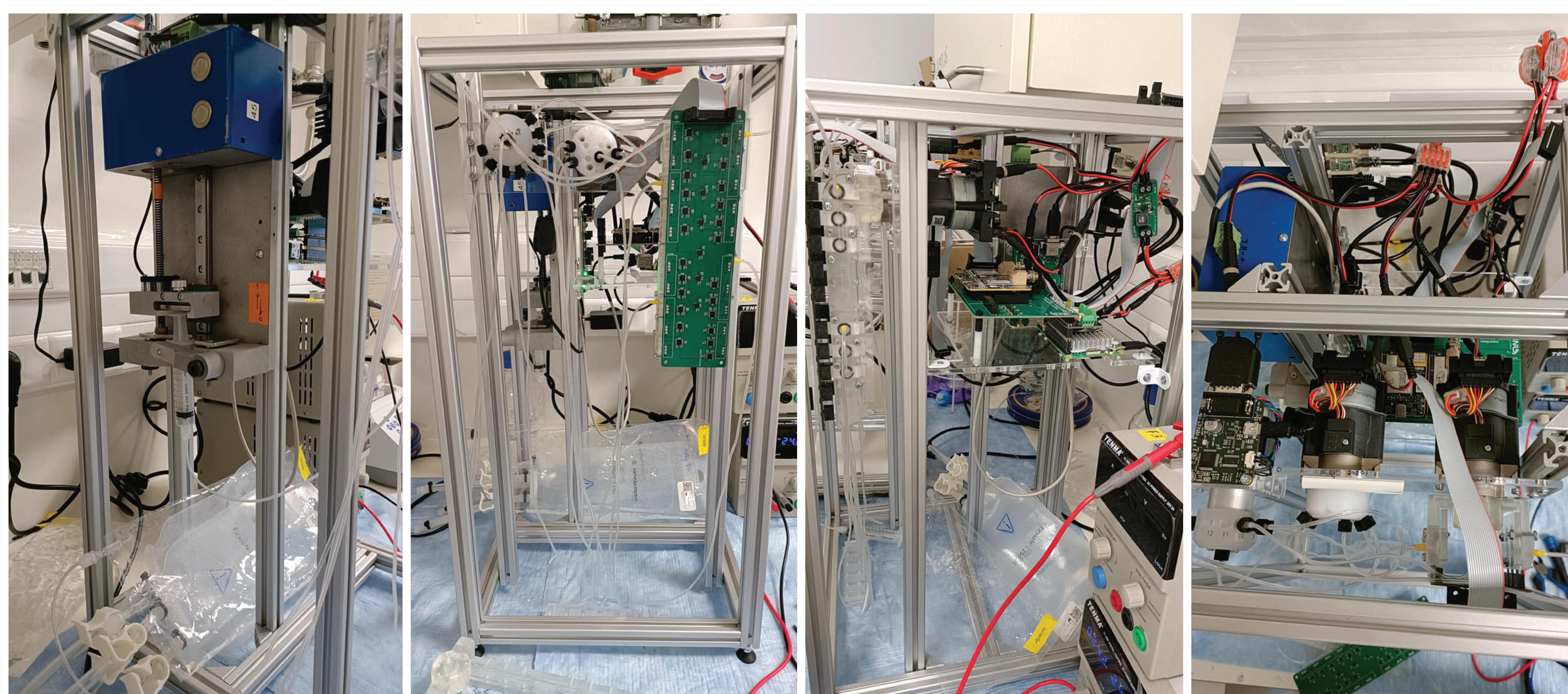
Electroplating and metal finishing facilities
 Automotive and industrial wastewater monitoring
 Water treatment companies and utilities
 Environmental monitoring and compliance verification

+ Patent status

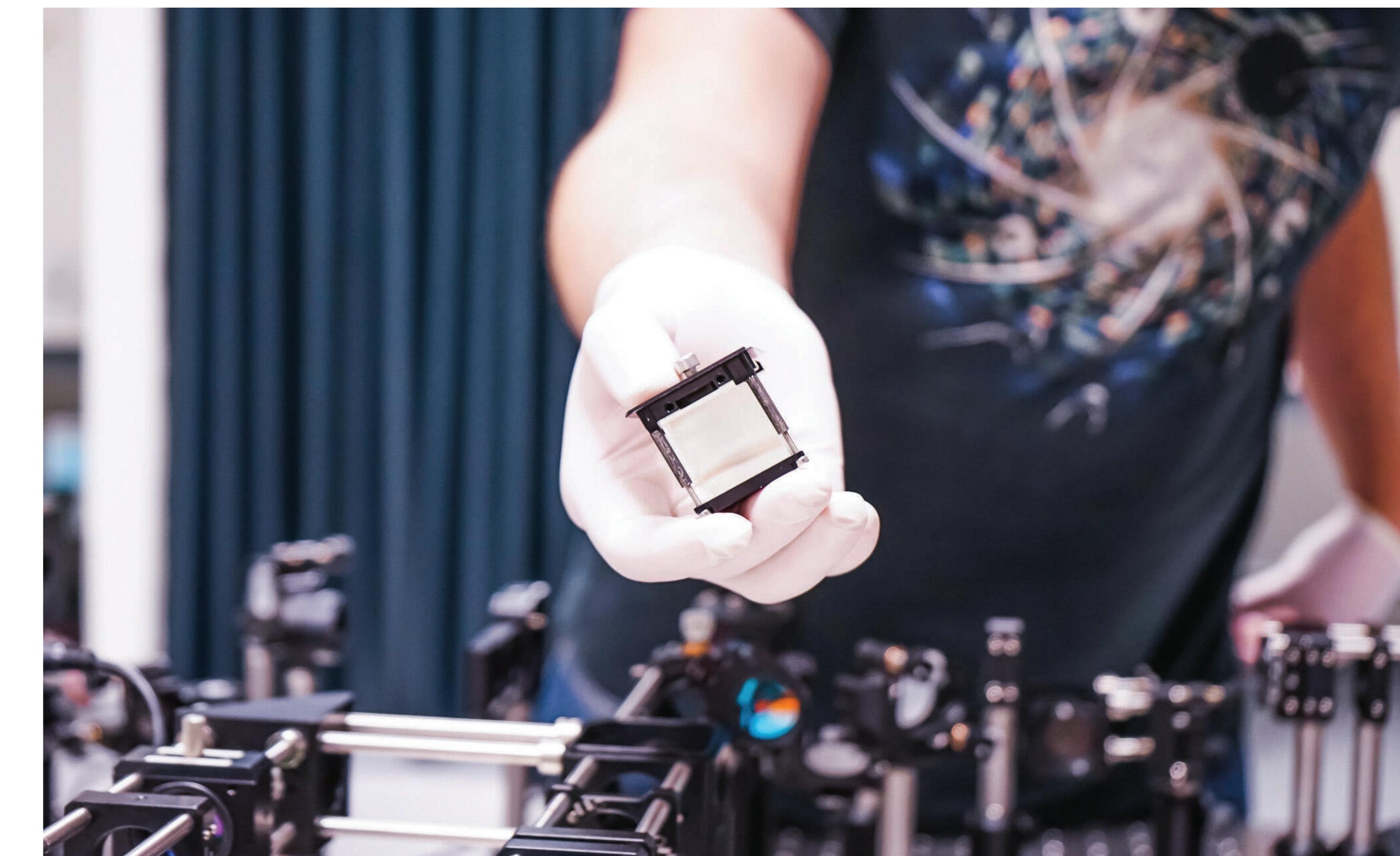
Patent filed under PCT/IB2025/059768

+ Key benefits

- In-situ, real-time monitoring of heavy metal ions without extensive sample preparation;
- Automated automation: end-to-end workflow requiring minimal operator intervention;
- The modular design allows the easy-tailoring of the system to be used for other water matrices;
- Multiple operation modes: automated, stand-by, and remote;
- Reduced environmental footprint: low-power electronics and eco-friendly analysis.



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