

## Sensors and Networks for Environmental Monitoring

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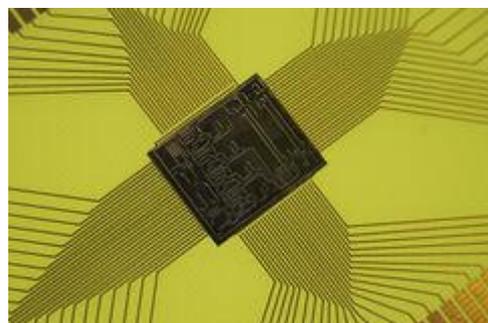
Royal Society of Chemistry, Burlington House, London

### Conference Report

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Jointly organised by the RSC's Environmental Chemistry and the Automation and Analytical Management Groups, this meeting saw 53 delegates convene in Burlington House to hear the latest developments on environmental sensors. The topics ranged from the development of sensor materials and technologies in the lab to the integration of sensors within networks and how to best interpret data from networks. The event also involved two exhibitors and seven poster presentations.

The first talk was delivered by **Krishna Persaud** from the University of Manchester, who introduced the latest advances in the application of low cost organic field-effect transistor-based (OFET) sensors to air quality monitoring. Krishna described the development of the first OFET sensors for NO<sub>2</sub> and CO detection and their pilot deployment in Manchester. Co-location with a local authority air quality station showed good agreement with reference instrumentation.



The next talk was given by **Tanya Hutter** from the University of Cambridge, describing the development of novel optical sensors for environmental applications. Tanya's work focuses on detecting trace volatile organic compounds (VOCs) using optical fibres coated in nanoporous materials. As the analytes adsorb onto the pores due to capillary condensation, the optical properties of the fibres are changed, and a signal in the mid-infrared can be obtained. These sensors are capable of high sensitivities thanks to the high surface area of the nanoporous material.

The last talk of the morning was delivered by **Matt Loewenthal** and **Harry Lloyd** from the English Environment Agency (EA), who described the network of water quality probes currently in place in ~2700 sites across England, each measuring a number of relevant variables in real time (e.g. dissolved oxygen, temperature, conductivity and turbidity). They then discussed a series of case studies in which the monitoring networks provide insights into water quality. These included an assessment of water quality and hydrometric data from the River Lea catchment in London, the impact of Storm Ophelia on Lake Windermere, and that of Glastonbury Festival on local water quality. The morning closed with presentations from the two exhibitors (Air Monitors and Enviro Technology), followed by lunch.

The first session of the afternoon focused on regulation, policy and standardisation. **Rob Kinnersley** from the EA discussed environmental sensors from the perspective of regulation, and stressed the need for improved temporal and spatial coverage to establish the impact of environmental policies. He highlighted how the latest generation of low cost sensors have the potential to fulfil this requirement, but need more robust validation. This was tackled by the following talk, in which **Nick Martin** from the National Physical Laboratory reported on the latest advances in the standardisation of low cost sensors for air quality monitoring. Nick explained how the relevant European Standardisation Committee (CEN) is currently developing a technical protocol assessing the suitability of low cost sensors for different types of environmental applications.

The final session of the day was opened by **Matthew Loxham** from the University of Southampton, who gave an account of the measurement and characterisation of particulate matter (PM) from port-related activities in multiple sites across Southampton. By deploying PM sensors in a number of locations, this work revealed the impact of shipping activities on the urban air quality and opened the way to a full source apportionment model.

**Rod Jones** from the University of Cambridge spoke next and presented preliminary results from 105 air quality sensors spread across the capital for the Breathe London campaign. He showed how it was possible to use network data to decouple local and non-local (background) signals for each gaseous pollutant. Interestingly, comparison of the background signals derived from London with those from Cambridge and Paris revealed that regional trends showed little variation over large distances (> 100 km).

The final talk of the day was given by **Amy Stidworthy** from Cambridge Environmental Research Consultants (CERC), and focused on integrating data from sensor networks in atmospheric dispersion models. Amy described how the high spatial resolution afforded by low cost sensors can help reduce the uncertainty in the emission values derived from these models, leading to more accurate emission inventories.