



BOOK OF ABSTRACTS

EMAIL

esfc.lisbon@chemistry.pt

WEBSITE

21-esfc-lisbon.events.chemistry.pt

Book of Abstracts

21st European Symposium on Fluorine Chemistry

ESFC LISBON 2025

Lisbon, 3 – 9 August 2025

ISBN 978-989-8124-47-0



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ESFC LISBON
21st European
Symposium on
Fluorine Chemistry

<https://21-esfc-lisbon.events.chemistry.pt/>

Real-time Biomonitoring of Emerging Contaminants in Water Resources

Danelle Botha², Christoff Truter^{1,2}, Gideon Wolfaardt^{1,2,}*

(1) Stellenbosch University Water Institute, Stellenbosch, South Africa

(2) Department of Microbiology, Stellenbosch University, Stellenbosch, South Africa

**e-mail: gmw@sun.ac.za*

Engineered microbes coupled to automated IoT devices offer a potentially effective approach for real-time detection of emerging contaminant (EC) in water, which became a global challenge that pose health risks to humans and ecosystems. Current analytical chemistry-based approaches that are applied for EC screening in environmental waters, such as mass spectrometry remain the golden standard, but due to their high cost, requirement for specialized facilities and user expertise, slow turn-around as well as the growing number of EC's to screen for, their application remain limited. Our research explores the use of engineered yeast and algae as part of a real-time EC sensor system in which biofilm 'cell factories' serve as a constant supply of microbes for inline continuous-flow exposure to environmental contaminants. *Saccharomyces cerevisiae* was stably transformed with genetic circuitry to report the presence of estrogenic ECs as a fluorescence signal, whereas a mutant *Chlamydomonas reinhardtii* strain, as well as a wildtype strain were tested. The system's design enables continuous flow exposure without the need for prefiltration or the risk of modified organisms entering the environment where it is installed, with additional advantages such as low cost and deployable requiring minimal skills. A conceptual framework for groundwater EC monitoring and regulation by public and private sector stakeholders, using engineered microbe-driven IoT devices was incorporated to enable effect-based monitoring at remote locations, and to serve as a platform for further refinements such as microbes with improved sensitivity and novel biological pathways to expand the range of health risks that can be detected.