SCIENCES & BIOENGINEERING SCIENCES

The research group
Archaeology, Environmental changes & Geo-Chemistry (AMGC)
has the honor of inviting you to the **PhD public defense** of

Yiqi Su

for the degree of Doctor of Sciences and
joint Doctorate in Biomedical and Pharmaceutical Sciences
in collaboration with Université Libre de Bruxelles

AhR- and ER-CALUX Bioassays for Environmental Monitoring of Polycyclic Aromatic Compounds and Xenoestrogens

Supervisors:
Prof. Dr. Ir. Marc Elskens (VUB)
Prof. Dr. Pierre Van Antwerpen (ULB)

Co-supervisor:
Prof. Dr. Yue Gao (VUB)

Time: **Tuesday, October 7, 2025** at **16h00**

Location: **Room 607**, Bâtiment **NO**, La Plaine Campus of Université libre de Bruxelles

Teams streaming:
Meeting ID: 364 207 989 097 2
Passcode: nZ2XX94T

Members of the jury:
Prof. dr. Luc Leyns (VUB, chair)
Prof. dr. Martine Leermakers (VUB)
Dr. Natacha Brion (VUB)
Prof. dr. Cédric Delporte (ULB)
Prof. dr. Veronique Mathieu (ULB)
Prof. dr. Jean-François Focant (Ulg)
Prof. dr. Wei Guo (Beijing University of Technology, China)

Curriculum vitae

Yiqi Su obtained her Master of Science in Chemistry from the Vrije Universiteit Brussel (VUB) in 2021. In the same year, she began her PhD at AMGC-VUB, with funding from the Chinese Scholarship Council. Her research has focused on assessing the biological activity of emerging environmental contaminants using the CALUX bioassay, a method she further validated through a collaboration with ULB using LC-DAD-FLD chemical analysis.

Throughout her four-year doctoral study, she has contributed to two impactful projects, GROW and Plastic City. She has also (co-) authored 4 publications, with 2 as first author, and presented her findings at 4 international conferences, and supervised two master's theses.

Abstract of the PhD research

Since the early 2000s, emerging environmental contaminants have gained increasing scientific and regulatory attention. These substances can persist in the environment, accumulate in organisms, and pose a significant threat to ecosystems and human health. Despite this, they are insufficiently studied, monitored, and regulated. This thesis focuses on two important groups of such contaminants: polycyclic aromatic compounds (PACs) and xenoestrogens (XEs). The challenge in environmental science is not only detecting these substances at trace levels, but also understanding their biological impact, especially when they appear in complex mixtures.

To address this, my thesis applies cell-based bioassays to assess how living cells respond to chemical mixtures. A key method is the Chemically Activated LUciferase gene eXpression (CALUX) bioassay. It uses genetically modified cells with a luciferase gene that produces light when activated by specific chemicals, providing a direct measure of their receptor-mediated activity.

My work first focused on establishing an optimized protocol for the CALUX bioassay to assess the bioactivity of PACs. I then conducted studies on the receptor activation of individual chemicals and investigated the additive bioactivity of known chemical mixtures. Subsequently, I developed and optimized PACs extraction methods for both water and soil samples, specifically for bioassay analysis. The efficiency of these extractions was validated using liquid chromatography coupled with a fluorescence detector.

These validated methods were applied in two case studies. The first case evaluated the environmental risks associated with wastewater reuse in agriculture by monitoring bioactive PACs and XEs in wastewater, groundwater, and soil. The second case assessed the transport of PACs on microplastics in the Zenne River, using suspended solids as a proxy to rapidly screen for bioactive PACs in the urban waterway.

This research provides validated, cell-based bioassays as an efficient tool for rapidly screening the biological impact of complex environmental mixtures, thereby advancing the monitoring and regulation of emerging contaminants.