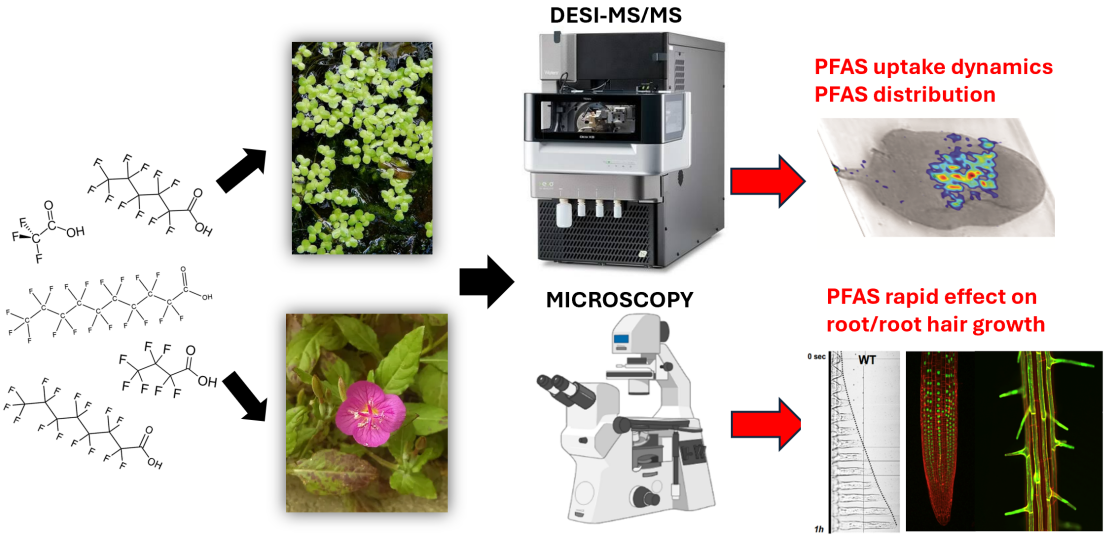
STATE-OF-THE-ART MASS-SPECTROMETRY IMAGING AND FLUORESCENCE MICROSCOPY TO STUDY PFAS UPTAKE AND EFFECTS IN HYPERACCUMULATING PLANTS

PFAS are an ever-growing group of chemicals with applications in a plethora of industrial, agricultural and consumer products. As a consequence of their sheer abundance and the way in which they are being produced, a variety of short- and long-chain PFAS compounds end up in the environment.
Phytoremediation, i.e. using plants to extract pollutants from the environment, shows great promise as a less-invasive yet scalable method to gradually remove a subset of PFAS from contaminated water and soil.
Studies have focused on which aquatic and terrestrial plant species could function as 'hyperaccumulators' but much less is known on how and where these plants accumulate PFAS and which PFAS characteristics determine efficient uptake, transport and storage.

You will use a combination of cutting-edge DESI-MS/MS mass-spectrometry imaging and advanced fluorescence microscopy to unravel:

- how fast different PFAS species are taken up by duckweed and primrose (*Oenothera rosea*)
- where, at a sub-organ resolution, this uptake occurs
- how fast and to where different PFAS species are distributed in the plant
- how PFAS chain-length and functionalization affect rapid changes in root and root hair growth.

This project grants you rare access to state-of-the-art technologies, benefitting your CV. You will receive hands-on training and continuous mentoring in a accessible and stimulating environment. The data coming from your experiments will be part of a broader and ongoing effort to fast-forward sustainable and tangible environmental PFAS decontamination.



Methods:

- *in vitro* plant cultures
- PFAS extraction and quantification using UPLC-MS/MS
- DESI-MS/MS mass-spectrometry imaging of PFAS distribution in plants
- fluorescence microscopy coupled to microfluidics to study rapid plant growth responses
- Advanced image analysis

References:

- Guo et al. *Nature Communications* 2025 (https://doi.org/10.1038/s41477-024-01637-8)
- Zhang et al. *Analyst* 2021 (https://doi.org/10.1039/d0an02118k)
- Zhang et al., *Sci. Tot. Envir.* (https://doi.org/10.1016/j.scitotenv.2020.138357)

Promotors: Prof. Els Prinsen, Dr. Sébastjen Schoenaers and Prof. Kris Vissenberg
Email: els.prinsen@uantwerpen.be, sebastjen.schoenaers@uantwerpen.be, kris.vissenberg@uantwerpen.be
Tel: 03/2653711 Location: CGB U.5/U.6