

Title	Real-time separation of isomeric volatile organic compounds
PI	Luca Cappellin
Research Group	Analytical chemistry
Curriculum	Chemical Sciences
Location	UNIPD – DISC. Via Marzolo 1, Padova. Building 210 Floor 5
Contact	web: https://anachemgroup.it/
	email: luca.cappellin@unipd.it

Project description:

Real-time volatile organic compound (VOC) detection is of utmost importance in several fields. It is widely employed in atmospheric chemistry, e.g. by NASA, and it is also emerging in food science and technology, plant science, chemical biology, and medical science.

Current analytical techniques for online VOC detection are based on chemical ionization coupled to mass spectrometry (CI-MS). Such instruments are extremely fast and sensitive but suffer from limited VOC separation. Isomeric VOCs are typically not separated which is often a strong limitation in the above-mentioned fields. For instance, plant communication is strongly relying on specific isomers.

Coupling CI-MS to ion mobility (IMS) could overcome these problems. The PhD project will explore the potential of coupling CI-MS and IMS for the real-time separation of relevant isomers. The project is in collaboration with the Fondazione Edmund Mach (TN) and Tofwerk AG (Switzerland), a leading MS manufacturing company. The PhD project will be highly beneficial to the parallel projects PURPEST, IMPLICIT, BIOBUILD, with >20 partners from EU institutions.

Publications:

Comprehensive characterization of atmospheric organic carbon at a forested site. 2017. NATURE GEOSCIENCE, 10(10), 748–753, <https://doi.org/10.1038/ngeo3018>

Gas chromatography coupled to time-of-flight mass spectrometry using parallel electron and chemical ionization with permeation tube facilitated reagent ion control for material emission analysis. 2023. RAPID COMMUNICATIONS IN MASS SPECTROMETRY, 37, e9461, <https://doi.org/10.1002/rcm.9461>

Diel rhythm of volatile emissions from males and females of the olive fruit fly *Bactrocera oleae* using PTR-ToF and GC-MS. 2024. JOURNAL OF INSECT PHYSIOLOGY, 153, 104596. <https://doi.org/10.1016/j.jinsphys.2023.104596>

Collaborations/Network:

International: Colby College (USA), Harvard University (USA), NIBIO (NO), JKI (DE), Wageningen University (NL), Innsbruck University (AU), ETH (CH), Université de Neuchâtel (CH), Tofwerk AG (CH). National: Fondazione Edmund Mach (TN), CNR-IBE (TN), CNR-IMEM (TN), Istituto Nazionale dei Tumori (MI), Università di Pisa, CNR-IPSP, Università Federico II.

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BIOBUILD, 2024-2027, European Commission.