

SUSTAINABLE MATERIALS, PROCESSES AND SYSTEMS FOR ENERGY TRANSITION

DM 630 UNICA/3SLAB - Advancements in chemical ionization mass spectrometry and in solid state sensors

Funded By	3LABS SRL [P.iva/CF:04146420965] Ministero dell'Università e della Ricerca - MUR [P.iva/CF:96446770586] UNIVERSITA' DEGLI STUDI DI CAGLIARI [P.iva/CF:00443370929]
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Context of the research activity	<p>The project revolves around three main objectives: i) To develop methods with high specificity and sensitivity for real-time monitoring of volatile compounds, leveraging the latest technological innovations in the field of chemical ionization mass spectrometry. This includes the use of high-resolution time-of-flight analysers, the implementation of various precursor ions for chemical ionization, and the innovative application of ion mobility mass spectrometry, ii) to support the development and testing of solid-state sensors aimed at monitoring volatile compounds with instrumentation that is more economical and compact compared to advanced but bulky and costly methodologies; iii) to apply the developed methodologies to relevant case studies in the agro-industrial sector, such as the analysis of headspace during food tasting, and in the environmental sector, such as measurements of air quality in both indoor and outdoor environments.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP: E14D24002340004</p>
Objectives	<p>The project embraces many of the missions of the PNRR:</p> <p>Culture and tourism: The rich Italian culinary culture, famous throughout the world, is supported and promoted through qualitative and quantitative analyses, in particular of volatile compounds which are among the main drivers of perceived quality. Furthermore, high-sensitivity monitoring of volatile compounds has relevance for air quality assessment and xxx forest bathing.</p> <p>Innovation: The development of rapid and non-invasive analytical techniques to optimize the production chain and monitor the quality of agri-food products and outdoor air quality is of primary interest for the industry.</p> <p>Education and research: Promotion of highly innovative approaches in an</p>

academic context with possible applications in different sectors.

Green revolution and ecological transition: The development of rapid and non-invasive techniques for assessing the quality of agri-food products allows us to minimize food waste in favour of sustainability, to develop new agri-food products by optimizing the application of methodologies such as fermentation.

Health: The greater control given by the use of these new analytical approaches allows for a better and more efficient assessment of the risks associated with air quality and food production/preservation processes.

**Skills and
competencies
for the
development of
the activity**

This highly interdisciplinary project, conducted within a research network of diverse laboratories, is open to candidates from various backgrounds. The ideal candidate should possess a strong scientific background in one of the key topics involved, including materials science (growth and characterization techniques of nanomaterials and devices), analytical techniques such as mass spectrometry, or food science and technology. Additionally, experience in statistics, data mining, and machine learning is highly desirable