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CHALLENGES IN TRANSFERING METHODS FROM THERMAL TO DIFFERENTIAL FLOW MODULATED GC×GC-MS/FID: FOOD "OMICS" INVESTIGATIONS

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Comprehensive two-dimensional gas chromatography (GC×GC) coupled with Mass Spectrometry (MS) is one of the most powerful analytical platforms now available for detailed profiling (identification and quantitation) and fingerprinting of medium-to-high complexity food samples [1]. Compared to one-dimensional systems, it offers remarkable separation power and unmatched peak capacity, rationalized 2D separation patterns that are distinctive sample fingerprints for classification and authentication.

Thermal modulated GC×GC platforms enable comprehensive investigations required in food "omics" and nutritional studies thanks also to their hyphenation with mass spectrometric detection, automated sample-preparation, olfactory detection and suitable data elaboration approaches.

The introduction of GC×GC platforms implementing differential flow-modulation, based on the design proposed by Seeley et al. [2], has opened a new perspective for the analysis of complex samples [3]. Lower operational costs, relative ease of use and simple maintenance make these platforms attractive also for routine operations.

This study investigates and critically discusses the feasibility of methods transfer from thermal modulated GC×GC to the differential flow modulated platforms adopting a reverse fill/flush injection dynamic for profiling and fingerprinting of medium-to-highly complex samples within food "omics" investigations.

Experimental results obtained with a parallel dual-detection configuration, will be discussed with a focus on data elaboration. Thanks to the template matching algorithm the effective method transfer is truly "comprehensive" and the information potential of the technique fully exploited also for routine quality controls and high throughput screenings.

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