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Analytical approaches for the determination of food quality markers: a focus on chemical safety and aroma of animal-derived products

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Based on research examples, the paper shows some recent analytical developments of our group for the investigation of both chemical safety and aroma of animal-derived food products.

A first section describes an original strategy based on foodomics to back-trace animal exposure to environmental micropollutants. In order to reveal animal exposure, metabolism end-products like volatile compounds were analyzed on edible tissues of animals fed with normal or intentionally contaminated diets. This untargeted approach was assessed on a large set of micropollutants including PCBs, Dioxins, PAHs, Brominated Flame Retardants and antibiotics.

A second section presents the development of GC×GC-MS/TOF methods for the multiresidue determination of targeted micropollutants in food. The versatility of the technique was assessed on a mix of micro-pollutants including PCDD/Fs, PCBs, OP- and OC-pesticides, Brominated Flame retardants and PAHs, whereas its resolution was demonstrated on a mix of 209 PCBs and 17 PCDD/Fs.

The third and last section of the paper shows our recent development in multidimensional GC and high resolution olfactometry for the monitoring of toxicants and odorants in processed food. In a first example, GC×GC-TOF/MS was used for the multiresidue determination of process-induced PAHs in meat cooked according to different cooking modes while a set of unique GC-Olfactometry devices including a patented GC-8O/MS system equipped with 8 sniffing booths and a heart-cut GC-GC-MS/O system enabled to reveal parallel changes in process-induced odorants. The relevance of these tools for designing safe and desirable processed food is also pointed out in a second example dealing with the development of meat products with reduced nitrite content.