BOOK OF ABSTRACTS

10th International Symposium on
RECENT ADVANCES IN FOOD ANALYSIS

September 6–9, 2022

Prague, Czech Republic

Jana Pulkrabová, Monika Tomaniová, Stefan van Leeuwen,
Michel Nielen and Jana Hajšlová
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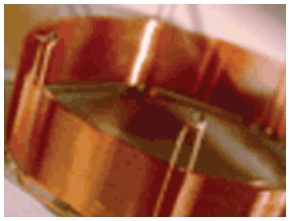

UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

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ARTIFICIAL INTELLIGENCE SMELLING MACHINES BASED ON TWO-DIMENSIONAL GAS CHROMATOGRAPHY: A HIGH-INFORMATIVE TOOL FOR FOOD AUTHENTICATION AND QUALITY ASSESSMENT

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The European hazelnut (*Corylus avellana* L.) is a tree nut mainly used by the confectionery industry. The industrial quality assessment of the raw materials is mainly based on human inspection to exclude damaged kernels and on sensory analysis to detect sensory defects and rancidity. A modern concept of food quality should implement molecular resolution methodologies capable to support traditional and well-established procedures while adding extra information about product authenticity, storage stability, and technological quality.
The volatile fraction of raw hazelnuts, also referred to as *volatilome*, encrypts most of the quality-related information on cultivar/geographical origin, post-harvest treatments, bacteria/moulds contamination, oxidative stability, and sensory quality. This latter relates to the peculiar quali-quantitative distribution of potent odorants that are capable to elicit distinctive yet unique sensory features resembling the identity of a specific food. A workflow capable to extract, isolate and quantify the key-aroma compounds of a product (*i.e.*, the aroma blueprint) has been recently defined as a Sensomics-Based Expert System (SEBES) acting as an Artificial Intelligence (AI) smelling machine.
This contribution realizes the AI smelling machine conceptualized by sensomics with some improvements related to analytical efficiency and information capacity. By comprehensive two-dimensional gas chromatography coupled with mass spectrometry and flame ionization detection (GC×GC-MS/FID) a single-step measurement is possible. Multiple headspace solid-phase microextraction (MHS-SPME) allows the accurate quantification of about 40 analytes including key-aromas, spoilage markers, and geographical tracers.
Results, visualized as odor activity values (OAVs) maps, resemble identity sensory features of the samples while facilitating the comparative process through their aroma blueprint. Moreover robust yet reliable quantitative data can be used for the development of authentication/discrimination models.
The proposed methodological approach, transferable on a routine basis, offers a great increase in resolution compared to traditional quality control protocols. From a single analytical run, multi-level molecular information is readily and reliably extracted.

Keywords: *European hazelnut, volatilome, sensory maps, chromatographic fingerprinting, artificial intelligence smelling machine*