



Institut "Jožef Stefan", Ljubljana, Slovenija



center za prenos tehnologij in inovacij  
na Institutu "Jožef Stefan"

# Licensing opportunity

## Assessing the degree of authenticity of natural flavourings

### Field of use

Food and feed ingredients,  
General food products,  
Data processing, analysis and  
input services

### Technology areas

Artificial Intelligence (AI),  
Information  
Technology/Informatics,  
Knowledge Management,  
Process Management

### Stage of development

Available for demonstration

### IPR status

Secret Know-how

### Developed by

Jožef Stefan Institute

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### Summary

The Slovenian public research organization has developed a new system for authenticity assessment of natural flavourings. This system is based on the analysis of specific compounds and their stable carbon isotope composition. The measurement data are analysed by machine-learning algorithms to characterise the authenticity of natural vs. artificial flavourings.

Partners are sought among food and aroma industry for technical and research cooperation agreements.

### Description of the Invention

The expanding industrialization of food and aroma products have generated the need to authenticate the production method of marketed products. With increasing pressure to satisfy consumer needs and the high price of natural flavourings compared to synthetic ones, makes naturally flavoured products especially vulnerable to economically motivated adulteration. The relatively new science of food forensics is employing a range of developing isotopic techniques that have allowed detecting adulterated and counterfeit food.

The Slovenian research group has developed a new system for authenticity assessment of natural flavourings. Typically, the artificial aroma is produced by mixing several different compounds originating mostly from oil. In essence, they are chemically very similar to natural compounds and usually being added to natural products makes them even more difficult to identify. The complexity of the problem has led to the development of a system based on machine-learning. The basis of the system is a database describing different aromas, both authentic and artificial. The data are based on chemical analysis of compounds in a sample obtained by several methods: gas chromatography/mass selective detector (GC-MSD), gas chromatography—combustion—<sup>13</sup>C isotope ratio spectrometry (GC-C-IRMS) or elemental analyser/isotope ratio mass spectrometry (EA/IRMS). The data obtained along with the expert knowledge are collected in a database and analysed. The analysis is based on the degree of confidence in the partial characterisation of the authenticity for any given flavour. It is a multi-step procedure, where each next step is driven by the previously obtained estimates.

The researchers come from a Slovenian public research organization. Their multi-disciplinary research involves a combination of physical, chemical and biology processes influencing the environment. On the other hand, there is a group of computer and artificial intelligence specialists who contributed to the flavours-characterization system based on data-mining approaches.



- The partners are sought in food and aroma industry for technical cooperation agreement for sample testing and verification and specialized laboratories for testing the food products for research cooperation agreements for expanding the database and expert knowledge in classifying aroma compounds.

### Main Advantages

Aroma classifications are performed by machine learning rather than manually, by an expert.

### Partner Sought

Partners are sought among food and aroma industry. Partners are sought for:

- Technical cooperation agreement for random sample testing applications

Partners are sought among specialized laboratories for testing food products for:

Research cooperation agreements for expanding the database and expert knowledge in classifying aroma compounds.