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**BOOK OF ABSTRACTS**

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10:00 – 10:30	IL-23	Ana Guilherme Buzanich (Federal Institute for Materials Research and Testing, Germany): <i>Synchrotron Radiation: Materials applications</i>
10:30 – 11:30	COFFE BREAK AND POSTER SESSION (Asturias room)	
11:30 – 11:45	O-51	Determination of mercury in fish samples by CV-MIP OES after alkaline extraction, <b>Fiorella Iaquina</b> .
11:45 – 12:00	O-52	Chemical vapor generation of cadmium: detector comparison and development of a simple preconcentration step, <b>Linda Sagapova</b>
12:00 – 12:15	O-53	Properties of an axially viewed microwave-sustained, inductively coupled, atmospheric-pressure plasma (MICAP) as source for optical emission spectrometry, <b>Helmar Wiltzsche</b>
12:15 – 12:30	O-54	Vibrational spectroscopy applied to honey spirit characterization, <b>Ofélia Anjos</b>
12:30 – 12:45	O-55	The use of PCA supported Raman microspectroscopy for identification of glioblastoma multiforme brain tissue alterations, <b>Kamil Kawon</b>
13:00 – 13:30	CLOSING CEREMONY	
13:30 – 14:30	FAREWELL COCKTAIL	

## 0-54.- Vibrational spectroscopy applied to honey spirit characterization

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### Abstract

Distilled spirits are obtained by fermentation of organic materials containing carbohydrates followed by a controlled distillation process. Given its content in carbohydrates, honey is a good raw material for spirit production. Honey gives to the final spirit some sensory notes such as fruity, floral and sweet and bitter, vegetative/herbaceous and smoky. This spirit exhibits low or quite null methanol content, which is an interesting advantage in comparison with other spirits. Vibrational spectroscopy techniques have already been applied as a powerful tool to assess the quality of beverages [1,2]. In this work the honey spirit quality was assessed by standard methodologies and compared to spectral information obtained by FTIR-ATR and FT-RAMAN, during the distillation process. Honey spirit from different honeys raw materials was characterized according to pH, acidity, CIELab chromatic characteristics, alcoholic strength, methanol content, acetaldehyde content, ethyl acetate content and higher alcohols content. The standard analyses were performed according to the official methods [3] and the methanol, acetaldehyde, ethyl acetate and higher alcohols content were identified by chromatography-mass detection (GC-MS) and quantified by gas chromatography-flame ionization detection (GC-FID) [2]. FTIR-ATR spectra were acquired in a Bruker spectrometer (Alpha) with a resolution of 4 cm<sup>-1</sup> in the wavelength region 4000-400 cm<sup>-1</sup>. The FT-RAMAN spectra were acquired using a spectrometer (BRUKER, MultiRAM) with a spectral resolution of 4 cm<sup>-1</sup>, scanner velocity of 5 KHZ and 100 scans per sample. All spectra were collected in triplicate at a constant room temperature of 20°C. Chemometric analysis were performed using the Unscrambler® X, version: 10.5.46461.632 (CAMO Software AS, Oslo, Norway) and OPUS®, version: 7.5.18 (Bruker Optik, Germany).

Honey spirits had null concentrations of 2-butanol and 2-propen-1-ol and lower concentration of 1-butanol in comparison to the grape marc spirit and a balanced concentration of 2-methyl-1-butanol and 3-methyl-1-butanol. However, the composition of spirits varied depending on the honey type. Concerning the spectral information, it was easy to distinguish the spirits regarding the honey used as raw material, as well as the different stages of the distillation process. Principal component analysis (PCA) performed with the analytical parameters were quite like those performed with spectral data both with FTIR-ATR and FT-RAMAN. These results allow concluding that FTIR-ATR and FT-RAMAN are powerful techniques for the characterization of honey spirits as well to monitoring the distillation processes. However, FT-RAMAN data allows an easier distinction of the spirits between raw material used. The results demonstrate the potentiality of these two spectroscopic techniques in conjunction with chemometric analysis to discriminate and characterize honey spirit.

**Keywords:** Honey spirit; FTIR-ATR; FT-RAMAN; distillation process

### References

- [1] O. Anjos, A.J.A. Santos, L.M. Estevinho, I. Caldeira, *Food Chemistry*, 205 (2016) 28–35
- [2] O. Anjos, R. Santos, L.M. Estevinho, I. Caldeira, *Food Chemistry* 305 (2020) 125511, 1-7
- [3] OIV (2014). *Compendium of international methods of analysis of spirituous beverages of vitivinicultural origin*. (Paris).

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