CHARACTERIZATION OF THE GROUND PAPRIKA SAMPLES USING RAMAN SPECTROSCOPY. A. Gucsik, M. Veres, L. Himics, I. Rigó Wigner Research Center for Physics, Hungarian Academy of Sciences, Konkoly Thege Miklós út 29-33, H-1121, Budapest, Hungary (sopronianglicus@gmail.com).

Introduction: The micro-Raman spectrometer can be used for non-destructive determination of the composition, contaminants and their distribution even at very low concentrations. Micro-Raman spectroscopy as a powerful technique can be used in food industry, especially in the gound pepper or paprika characterization in order to determine the paprika sample's origin as well as their quality.

Experimental procedure: The instrument used for the measurements was a Renishaw 1000 Raman spectrometer attached to a Leica DM/LM optical microscope. The excitation was done with a diode laser of 785 nm (1.58 eV), with a focused laser beam diameter of 500x using a sample of ~ 2 μm. The resolution of the spectra was 0.5 cm^{-1}, the time of each spectrum was 10x10 seconds. The ground paprika samples including Chinese, Peruvian, Spanish, Hungarian and Szegedi were placed on a Si-plate using a lab spoon such as spatula. Raman measurements were always preceded by optical microscopic observations. By avoiding inhomogeneities and other pollutants within the samples, at least seven measurements were made per sample.

Results and Discussion:

Optical Microscope Observations: Among the five selected pepper paprika samples, the Szeged/the Hungarian pepper has the most vivid red color assuming that these samples contain the most aromatic compounds. In contrast to the above, the Chinese sample shows yellowish pale red. In all five samples, relatively high density of irregularly shaped shiny surfaces can be found in the translucent v. glassy parts break down. In the Chinese sample, oval and spherical black forms are punctuated in the yellowish reddish matrix material. Their size usually reaches 20 microns. It is assumed that these formations may be mold colonies due to incorrect storage (relatively high moisture content).

Raman Spectral Properties of the Ground Paprika Specimens: Samples with 785 nm excited Raman spectra are shown in Figure 1. It can be seen in the figure that the background fluorescence shows relatively high values for each sample. Therefore, in some cases laser power was reduced from 100% to 50%. The common feature of the spectra is that they have small intensity broad bands, mainly in the low frequency range (300-600 cm^{-1}) at the following peak positions: 346, 484 and 631 cm^{-1}, and a weak intensity narrow peak (Fig. 1). Characteristic or dominant strong peak intensity vibrational peaks appear in the Hungarian and the Szeged paprika samples: 997, 1150, 1180 and 1515 cm^{-1}, some of which contain carotionic CH_3 groups (methyl groups) [1].

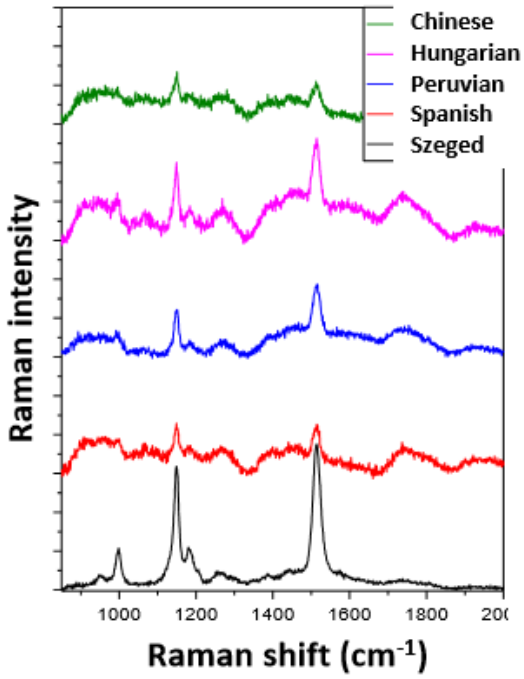

Figure 1. *Raman spectral properties of five ground paprika samples (baseline-corrected spectra).*

Conclusions: Raman spectroscopic measurements (especially at 785 nm excitation) are well suited for the determination of origins of the ground paprika samples. In the case of Hungarian samples, it is also possible to show characteristic features. Some top parameters are suitable for distinguishing between different samples.

Reference:

[1] Di Annibal C. V. et al. (2012) *Spectrochim Acta A, 87,* 135-141.