

Raman spectroscopy visualization of the distribution of cosmetic actives in the skin

Bazela K.¹, Debowska R.¹, Pasikowska M.¹, Dolegowska B.², Rogiewicz K.¹, Eris I.¹

¹ Centre for Science and Research, Dr Irena Eris Cosmetic Laboratories, Piaseczno, Poland

² Department of Laboratory Diagnostics, Pomeranian Medical University, Szczecin, Poland

INTRODUCTION:

Raman spectroscopy is becoming more comprehended and widely used method of biochemical analysis of tissues. Raman spectra provide extensive information about the chemical composition of the biological samples and allow the identification of macromolecules such as nucleic acids, proteins and lipids based on their characteristic bands. In biological applications Raman spectroscopy has the advantage that the spectrum containing a large amount of information can be obtained from the intact tissue, and thus without interfering with the structure.

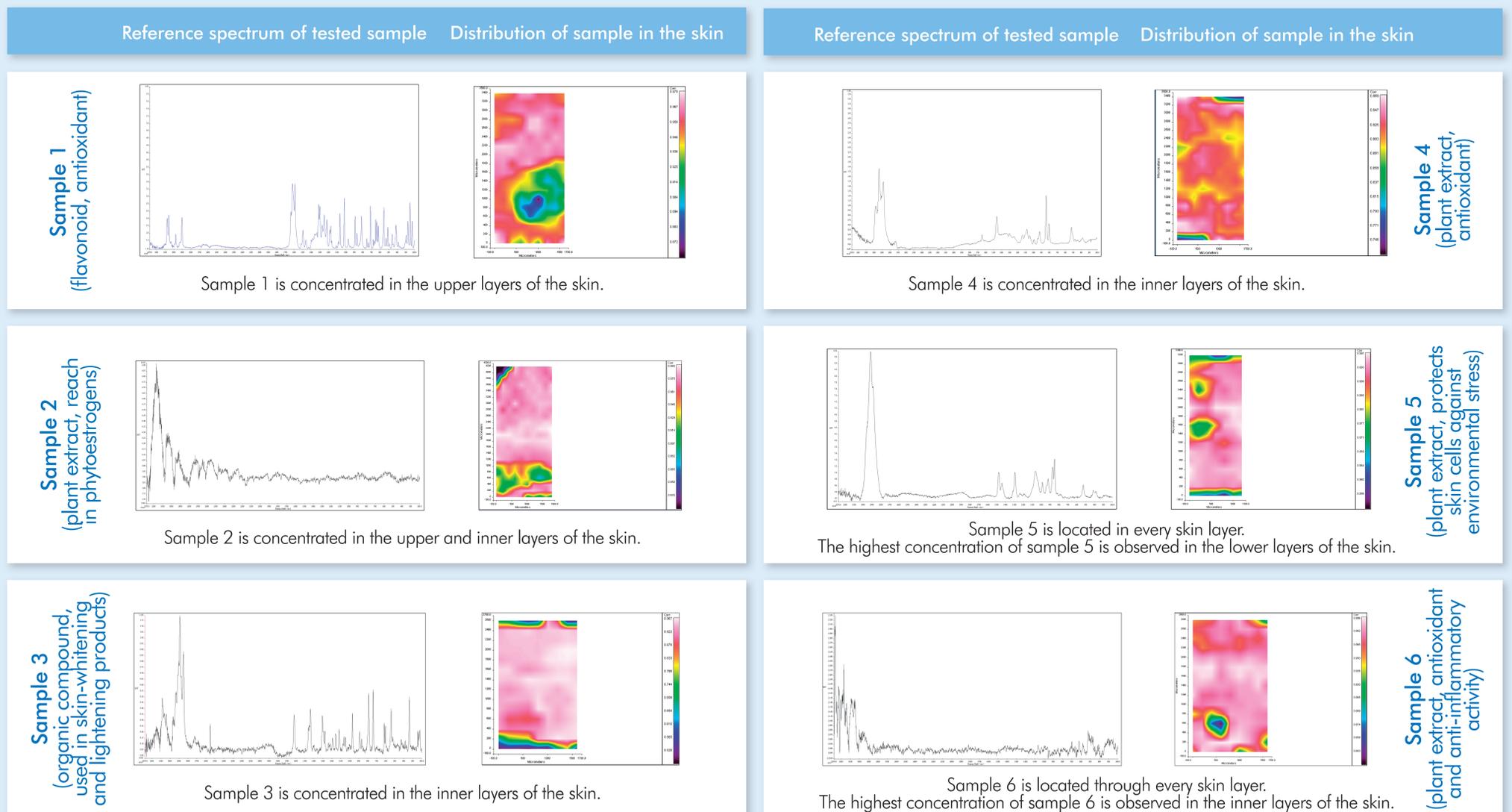
AIM OF THE STUDY:

The present study was aimed to visualize the distribution of potential cosmetic actives (sample 1-6) in the skin using Raman spectroscopy.

MATERIALS AND METHODS:

Skin patches were obtained during the facial plastic surgery of 25-year-old woman. Within 16 hours of collection, the skin was divided into pieces of approximately 25 mm². Tested substances were applied on the skin surface, which was then incubated at 37 °C for 72 h. After this time each piece of skin was cut along the transverse axis to obtain a cross-sectional profile of each layer of the sample and placed on gold-coated glass slides. Raman microscopy (RamanMicro 300, Perkin-Elmer) was used to examine the substances' penetration depth. The spectra were taken using an infrared laser (785 nm). In order to analyse the distribution of the tested substances in the inner layers of the skin, the resulting spectrum of tissues was compared with the reference spectra of the tested substances. An analysis of the distribution of samples resulted from a comparison of the test and reference spectra and from expressing their similarities with the correlation of the two images.

RESULTS:



RESULTS AND CONCLUSIONS:

The results of the present study revealed that within 72 hours of incubation tested actives were differentially distributed in the skin. It was also shown that tested actives can penetrate through stratum corneum and reach deep epidermis area which opens up their potential application as cosmetic ingredients. It would be interesting to study the distribution pattern in the skin of these ingredients incorporated to cosmetic formulations which could influence their penetration. On the other hand, we have shown that Raman spectroscopy could be a novel useful tool to visualize the distribution of cosmetic ingredients in the skin.

Acknowledgments

This work was supported by National Centre for Research and Development (NCBR) in the frame of Applied Research Programme (Contract No PBS1/B8/1/2012)