ATR-IR study of skin components: lipids, proteins and water. Part I: temperature effect.

Autorzy

Sylwia Olsztyńska-Janus

A. Pietruszka

Zdzisław Kiełbowicz

Mirosław A. Czarnecki

Rok wydania

2018

Czasopismo

Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy

Numer woluminu

188

Strony

37-49

DOI

10.1016/j.saa.2017.07.001

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

In this work we report the studies of the effect of temperature on skin components, such as lipids, proteins and water. Modifications of lipids structure induced by increasing temperature (from 20 to 90°C) have been studied using ATR-IR (Attenuated Total Reflectance Infrared) spectroscopy, which is a powerful tool for characterization of the molecular structure and properties of tissues, such as skin. Due to the small depth of penetration (0.6-5.6μm), ATR-IR spectroscopy probes only the outermost layer of the skin, i.e. the stratum corneum (SC). The assignment of main spectral features of skin components allows for the determination of phase transitions from the temperature dependencies of band intensities [e.g. $\nu_{as}(CH_2)$ and $\nu_s(CH_2)$]. The phase transitions were determined by using two methods: the first one was based on the first derivative of the Boltzmann function and the second one employed tangent lines of sigmoidal, aforementioned dependencies. The phase transitions in lipids were correlated with modifications of the structure of water and proteins.

Słowa kluczowe

aTR-IR, Biomedical engineering, Denaturation, phase transition, Skin, Temperature, vibrational spectroscopy

Adres publiczny

http://dx.doi.org/10.1016/j.saa.2017.07.001

Strona internetowa wydawcy

http://www.elsevier.com