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ATR-IR study of skin components: lipids, proteins and water.

Part II: Near Infrared radiation effect

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Abstract. Near infrared (NIR) radiation has been widely used in medicine and biomedical engineering. In spite of numerous studies the molecular mechanism of NIR radiation on biological systems has not been established as yet. The objective of this work was examination of the effect of NIR irradiation on the skin components. Modifications of lipid organization after NIR exposure vs. temperature (from 20 to 90 ºC) have been investigated using Attenuated Total Reflectance Infrared (ATR-IR) spectroscopy. This work is a continuation of our previous studies on the temperature effect on skin components [1]. After NIR exposure a temperature shift of the phase transition from the orthorhombic to hexagonal packing (≈40ºC) has been observed. In contrast, the second phase transition temperature (≈70°C) is almost invariable. The phase transitions in lipids were correlated with modifications of the structure of water and proteins. To our knowledge, for the first time the temperatures of the phase transitions after NIR exposure were investigated.

Keywords: ATR-IR, vibrational spectroscopy, skin, Near infrared, phase transition, denaturation, biomedical engineering.

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