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Raman microspectroscopy in dental research**Tomasz Buchwald, Zuzanna Okulus and Adam Voelkel**
Poznan University of Technology, Poland

Raman spectroscopy is very useful method to study the biological materials including teeth. In our research we used the Raman microspectroscopy to study the compositional and structural analysis of raw and prepared dental hard tissues. All the measurements were carried out on inVia Renishaw micro-Raman system with diode pumped laser emitting 785 nm near-infrared wavelengths. Raman microscope was helpful in the research of total surface energy values of teeth fragments (enamel, crown dentin and root dentin) with the use of inverse gas chromatography, to determine the surface changes of wet and dry bovine teeth tissues at microstructural level. In Raman spectra of wet and dry enamel, root and crown dentin some slight differences connected with water occurring are visible. For wet tissues, broad but weak band in region from 3000 to 3600 cm^{-1} assigned to stretching mode of OH^- groups is observed. Moreover, Raman microscope was effective for enamel and dentin characterization after surface preparation with the use of commercial 3-component etch-and-rinse bonding system. Raman spectroscopy allowed to determine the surface changes of hard tissue after each step of preparation (application of etchant, primer, adhesive and photopolymerization). There are no changes observed in the Raman spectra of dentin and enamel after etching. In the Raman spectra of all analyzed teeth tissues after application of primer and adhesive bands corresponding to functional groups present in compounds of these both bonding system components are observed. Presented analysis of surface composition changes after each step of enamel and dentine preparation confirms that the process was successfully conducted.

Biography

Tomasz Buchwald has worked as a Research Assistant in the Faculty of Technical Physics at Poznan University of Technology (Poland). A major area of his interest focuses on the application of spectroscopic methods, especially Raman spectroscopy, in analysis of biological materials and biomaterials properties. His current research interest is dental materials and human teeth affected by caries. He has published 16 articles in SCI Journals concerning mainly the determination of materials properties by use of Raman microspectroscopy.

tomasz.buchwald@put.poznan.pl

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