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Raman, Atomic Force Microscopy and Mass Spectrometry for Isotopic Ratios Methods Used to Investigate Human Dentine and Enamel

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Abstract : A detailed knowledge of the teeth structure is mandatory to understand and explain the defects and the dental pathology, but especially to take a correct decision regarding dental prophylaxis and treatment. The present work is an alternative study to the traditional investigation methods used in dentistry, a study based on the use of modern, sensitive physical methods to investigate human enamel and dentin. For the present study, several teeth collected from patients of different ages were used for structural and dietary investigation. The samples were investigated by Raman spectroscopy for the molecular structure analysis of dentin and enamel, atomic force microscopy (AFM) to view the dental topography at the micrometric size and mass spectrometry for isotopic ratios as a fingerprint of patients' personal diet. The obtained Raman spectra and their interpretation are in good correlation with the literature and may give medical information by comparing affected dental structures with healthy ones. AFM technique gave us the possibility to study in details the dentin and enamel surface to collect information about dental hardness or dental structural changes. $\delta^{13}C$ values obtained for the studied samples can be classified in C4 category specific to young people and children diet (sweets, cereals, juices, pastry). The methods used in this attempt furnished important information about dentin and enamel structure and dietary habits and each of the three proposed methods can be extended at a larger level in the study of the teeth structure.

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