Structural and thermal behavior of human tooth and synthetic hydroxyapatite

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Abstract - The structural and thermal properties of human tooth enamel, dentine and three synthetic hydroxyapatite samples with Ca/P relation of 1.57 (Ca deficiency), 1.67 and 1.77 (Ca excess), respectively, were carried out 20 to 600 ◦C to have information on the parameters involved on the ionic/electrical conductivities reported for human tooth enamel between 200 and 350 ◦C approximately.

We selected the enamel and dentine human tooth samples and three synthetic HAP samples with different Ca/P ratios to correlate their thermal behavior with the reported dielectric–semiconductor transition for human tooth enamel [1]. The analysis were carried out through x-ray diffraction, thermo-gravimetric analysis, differential scanning calorimetry, Fourier transform infrared spectroscopy and temperature programmed desorption. Chemical analysis was performed by x-ray characteristic energy dispersive spectroscopy. The results indicated that the release to the surroundings of absorbed water and lattice water is responsible for the thermal conductivity and electric and/or ionic conductivity reported for enamel [1]. Because this behavior is also observed in dentine and the synthetic HAP samples, variations in their conductivities must also be observed, but surely with some variations in temperature accordingly with the variations registered in the velocities of weight loss, as the thermal plots showed [2].

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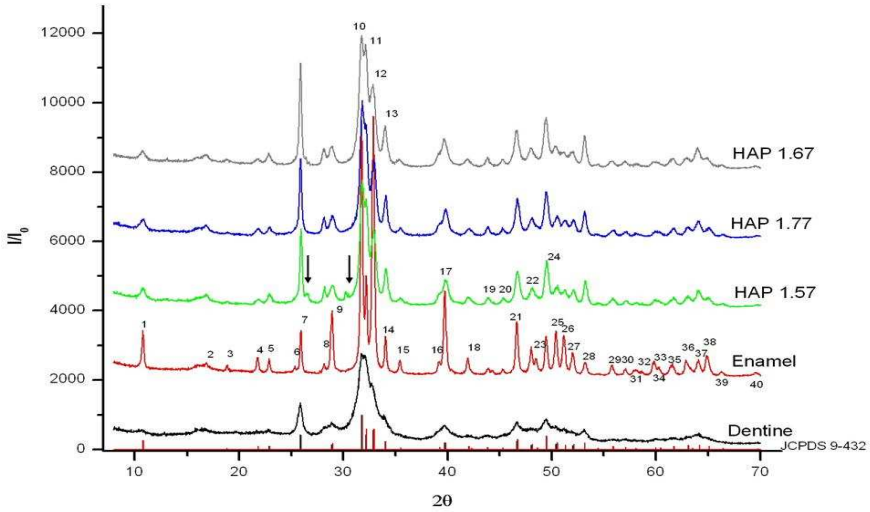

Figure 1 XRD spectra of the samples. The numbers correspond to the planes in the X-ray card PDF number 09-0432.

References

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