

## **Morphological Analysis of Human Dental Enamel and Humid Bovine Hydroxyapatite fused with Laser CO<sub>2</sub>**

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The application of laser in dentistry began with Gordon (1964)<sup>1</sup> and Stern et al (1966)<sup>2</sup>. Since then many applications have been done, such as its use in fixed cavities, treatments of soft tissue and surgical cuts among others. The preventions of defects in bones and fillers of dental cavities constituted a problem for the biomedical research. The aim of this work was to determine the morphological changes of the Human Dental Enamel (HDE) and bovine <sup>2</sup> hydroxyapatite by means of the application laser of CO<sub>2</sub> and their fusion effect of these biomaterials for dental and orthopedic applications.

Ten third molars extracted from young adults patients (between 18 to 25 years old) for clinical reasons, were used in five blocks and five of them were powdered. And powder and bulk samples of bovine hydroxyapatite were used. For the morphochemical characterization a Scannin Electron Microscopy Jeol 5900 LV that has attached and OXFORD ISIS EDS equipment. The CO<sub>2</sub> laser used was a Kuvars IV (LX 20) with wavelength of 10.6µm, excitation frequency of 40 to 45 MHZ, maximum beam diameter of 0.3 mm and 2 to 5 watts seconds with a water cooling system. For this work the condition were time of expansion of 0.3 seconds, distances from 5 cm and frequency 50 to 60 Hz.

During interaction a vibration was observed in the bond potential of the crystalline and molecular lattice in such a way that this molecules fused and recrystallized recovering hexagonal structure (fig 1). There was not any presence of calcium oxide in the EDS analysis so that it can not supposed to take part on the composition and micro explosions that took place which originated the waste of materials and microholes that are occupied ionically, diminishing the permeability, for the loss of water, carbonates and organic substance. Craters and borders were also observed suggested during the laser interaction. The effects will depend on the energy density and orientation of the prisms besides for coefficient of absorption of the water (fig.2).

### **References**

- (1) Gordon T. E. Some effects of laser impacts in extracted teeth. *J.Dent. Research* (2) 1964 372-375
- (2) Stern R.H, Sognages RF, Goodman F. Laser effect on in vitro enamel permeability solubility. *JADA* 73(4) 1966m 838-843
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