XXXII ENCONTRO NACIONAL DE FÍSICA DA MATÉRIA CONDENSADA

"XXXII Brazilian Meeting on Condensed Matter Physics"

SOCIEDADE BRASILEIRA DE FÍSICA

11 a 15 de Maio de 2009
Águas de Lindóia, SP

silicon nitrite probe (spring constant of 40 N/m and tip radius around 15 nm) for characterization. A previous image was carried out in order to choose one particular cell. Then, the chosen cell had its surface watched during its aging process in air for 3.5 days (84 h). For the first 24 h one image was captured per hour using tapping mode, which reduces considerably the friction forces on the cell surface, and consequently preventing any damage to the sample. After this first period, one new image of the cell was taken per 12 h until the end of the experiment. A particle analysis procedure revealed the behavior of the cell volume during the time lapse. The data obtained were compared to those already reported in the literature [2], so it was possible to find a pattern in the aging process of RBCs in air. This suggests a new way of dating a blood spot besides the usual optical microscope exam.

References:
[1] Yong Chen, Jiye Cai, Micron 37 (2006), 339-346.
[2] S. Strasser, A. Zink, G. Kada, P. Hinterdorfer, O. Peschel, W. Heckl, A. Nerlich, S. Thalhammer, Forensic Science International, Volume 170, Issue 1 (2007), 8-14.

[13/05/09 - P085]

X-ray powder diffraction used as a tool to investigate kidney calculi stones, Thierry Lopes, Leticia Kuplich, Danilo Souza, Cintia Orlando, Humberto Belich, Janaina Depianti, Edna Medeiros, Marcos Orlando, *UFES - ES - Brasil*, Luis Martinez, *IPEN - SP - Brasil*, Hamilton Correa, *UFMS - MS - Brasil* ■ The X-ray powder diffraction (XRPD) technique was used to study the phase composition of human renal calculi. The stones were colleted from 56 donors of Vitória City, Espírito Santo State - southeast - Brazil.

A XRD phase quantification reveals that 61% of the studied renal stones are composed exclusively by calcium oxalate (34% formed only by calcium oxalate monohydrate and 27% presents on both monohydrate and dihydratate calcium oxalate). The 39% multi composed calculi have various other phases such as uric acid and calcium phosphate. An investigation of XRD data of one apparent monophasic (COM) renal calculus revealed the presence of a small amount of hydroxyapatite. The presence of this second phase and the morphology of the stone (ellipsoidal) indicated that this calculus can be classified as non-papillary type and its nucleation process developed in closed kidney cavities.

A study of the phase transformation of monohydrate calcium oxalate into calcium carbonate $CaCO_3$ was carried out by annealing of a monophasic monohydrate calcium oxalate calculi at 200, 300, and 400 Celsius temperatures during 48 hours in a N_2 gas atmosphere. It was concluded that X-ray powder diffraction can be used as suitable technique to study the composition and phase diagram of renal calculi.

[13/05/09 - P086]

Dental enamel and synthetic hydroxyapatite heated and irradiated by laser of Er,Cr:YSGG : Characterization by FTIR and XRD., Jose da Silva Rabelo Neto, Thiago Martini Pereira, Vera Lucia Mazzocchi, Denise Maria Zezell, *IPEN / USP - SP - Brasil*, Luciano Bachmann, *USP - SP - Brasil*, Walter Miyakawa, *CTA - ITA - SP - Brasil*, Mario Ernesto Giroldo Valerio, *UFS - SE - Brasil* ■ The study evaluated the physical and chemical changes occurring in enamel and hydroxyapatite (HAP) under the action of heating in oven and under action of Er,Cr:YSGG laser irradiation, which can be used for cavity preparation, cutting bone and prevention of caries. The objective is to correlate the effect of the laser that causes a rapid heating and oven heating that causes a slow warming in the structure of materials trying to identify their composition and making them perhaps more resistant to the process of mineral loss. The HAP was produced by chemical precipitation from solutions of $Ca(NO_3)$ e $(NH_4)_2HPO_4$ under control of the reaction temperature, pH, and the powder enamel were collected of bovine tooth and is therefore calcined in a furnace under temperatures of 200^oC, 600^oC, 800^oC e 1000^oC. For laser irradiation, pellets were made of material and the powder from the samples by laser action were collected. The energies were used of 10,24 ± 0,18 J/cm^2 , 14,40 ± 0,27 J/cm^2 e 18,51 ± 0,35 J/cm^2 and for the enamel and 10,08 ± 0,20 J/cm^2 , 14,12 ± 0,25 J/cm^2 e 18,37 ± 0,37 J/cm^2 for HAP. Their materials were evaluated by the Fourier transform infrared spectroscopy (FTIR), it was observed changed in the bands of carbonate, phosphate and hydroxyl in the structure, which modily the solubility of the material and consequently alter their resistance to caries. The thermal action in the material influences the parameters in its crystallographic unit cell, it were measured changes in the parameters of the lattice unit cell related to changes of carbonates, phosphates and hydroxyl in the structure. Using the X-ray diffraction (XRD) it was detected new crystallographic phases in materials such as the appearance of phases of octacalcium phosphate, beta - tricalcium phosphate and tetracalcium phosphate addition to HAP, some of these phases are chemically more soluble than HAP, which makes the material less resistant to the process of demineralization. By Rietveld refinement of X-ray difratograms, it was obtained also the size of crystallites which increased the extent that increased the temperature and laser radiation. Through the atomic force microscopy (AFM) it was used to assess the size of the crystals of the material heated with range in size from 10 to 30nm. Support by: FAPESP CEPID (05/51689-2), CAPES/Procad (0349/05-4), Rede de Nanofotônica - MCT/CNPq (555170/2005-5).

[13/05/09 - P087]

The study of ultraviolet radiation and its connection with the skin cancer, Ricardo Bruno Pinheiro de Lima, , *Universidade Federal do Ceará*, Eduardo Augusto Felipe de Vasconcelos, *Universidade Estadual do Ceará*, Miren Maite Uribe Arregi, *Instituto do Câncer do Ceará-ICC*, Luewton Lemos Felício Agostinho, *Colégio Christus, Núcleo de Pesquisas Christus.*, Eloneid Felipe Nobre, *Universidade Federal do Ceará* ■ In this work we study the interaction between ultraviolet radiation and matter, that in our case is the human skin and show the levels of irradiance as a function of time of day in For-