Poster Session Afternoon (14h30 - 16h)

APPLIED OPTICS

[12/05/10 - P001]
Application of LIDAR-like equations to OCT signal analysis for total extinction coefficient determination, Marcello Magri Amaral, Marcus Paulo Raele, Eduardo Landulfo, Nilson Dias Vieira Jr., Anderson Zanardi de Freitas, *Instituto de Pesquisas Energéticas e Nucleares, IPEN - CNEN/SP* ■ Optical coherence tomography (OCT) is an interferometric technique, using a low coherence light source, that explore sample backscattering feature to acquire in depth cross-section images. Originally design to provide biological tissue image, OCT quickly increase your use in ophthalmology to be the only technique able to do eyes histological images. Although, due to technique explore sample backscattering feature, the backscattering signal carries unexplored information until now. The backscattering problem is similar to those found on LIDAR (Light Detection And Ranging) problem, this similar situation indicate the path that should be followed to solve the OCT problem. The aim of this work was to develop a LIDAR-like equation model to analyze the measured OCT signal and determine the total extinction coefficient of a sample. To determine the total extinction coefficient three inversion methods was used: the slope method solution, the boundary point method solution and the optical depth method solution, implemented on LabVIEW environment. To validate these solution methods an alumina sample the spectral reflectance and transmittance was measured using an Integrating sphere, the spectral absorbance was extracted from the first two. From this measure the total extinction coefficient was calculated and compared with the results acquired using OCT and the three solution methods. The analysis this property can in the future be use as a method to help clinical diagnoses when applied on biological tissues.

[12/05/10 - P002]
Methodology development for ATR-FTIR bone analysis, Carolina Benetti, Moises Oliveira santos, Thiago Martini Pereira, Denise Maria Zezell, *IPEN - CNEN/SP* ■ Infrared lasers (approximate 3μm) are able to cut mineralized tissue, particularly bone. The effect of thermal and mechanical stress can compromise the healing, as well as some compositional changes. The technique of Fourier Transform Infrared spectroscopy (FTIR) has been extensively used in the analysis of biological material, since this method can provide important information about the structure and composition of different materials. Usually, the spectrometers allow the characterization of different types of materials, in different physical states, however some parameters of the equipment must be set to optimize the spectrum obtained. FTIR techniques used was the attenuated total reflection (ATR) which permits to obtain spectra of solid samples regardless of their thickness. The ATR-FTIR used in this study was Thermo Nicolet Smart Orbit, with a diamond crystal (45^o angle of incidence) as the internal reflection element. The samples bone were obtained from femurs of New Zealand rabbits, 1.0cmx0.5cm slabs were sanded and polished using carbide papers until getting 100μm thicknesses. The parameters studied were: 1) The detector and Beamsplitter, related to the region of analysis; 2) The aperture the window, a way to control the intensity of the laser beam; 3) The resolution of the equipment, which determines how close two peaks will be one of the other; 4) The number of scans; 5) The speed of movement of the mirror of the interferometer. The results are: DTGS detector with XT-KBR beamsplitter, aperture size of 100, resolution of $4cm^{-1}$, 40 scans for sample, and mirror speed of 0,6329cm/s. The final spectrum using the determined parameter showed a good signal quality, better signal-noise rate, and a shorter time of data acquisition compared to a non-optimized one. Acknowledgments: FAPESP CEPID (05/51689-2), Rede de Nanofotônica - MCT/CNPq (555170/2005-5), CAPES/Procad (0349/05-4).

[12/05/10 - P003]
Study of chicken steam cells using defocusing microscopy, Ana Paula Alves, Oscar Nassif Mesquita, Ubirajara Agero, *UFMG* ■ Stem cells can potentially generate all the cell types in an organism. In this work we study chicken stem cells using Defocusing Microscopy (DM). With DM thin transparent objects phase objects can become visible in a bright-field light microscope. Then DM allows quantitative analysis of membrane surface dynamics of living cells. There is a great deal of information about the biochemical aspects of stem cells in the literature, but we are interested in the determination of cell mechanical proprieties. To access these properties we extract cells from chicken embryos. The samples were prepared with the material removed from mesoderm of chicken embryos using a micropipette attached to a syringe. The removed material is basically composed of somites that in process of development will differentiate in limbs dermis, skeletal muscle and vertebrae. The extract were cultivated at $37°C$ with 5% CO_2 in RPMI 1640 supplemented with fetal bovine serum. We examine the samples after incubation and observe that the majority of material that remains in culture was of adhered cells. These objects can easily be seen and analyzed with DM. According to DM, the contrast of defocused images is proportional to cell surface curvature. From the average image contrast we obtain chicken stem cells shape, size, and refractive index. From contrast fluctuations caused by the fluctuation of the membrane and cytoskeleton, we obtain cells bending modulus and cytoplasm viscosity.

[12/05/10 - P004]
High precision refractive index measurement of liquids, M.A.C. de Araújo, P.C de Oliveira, *UFPB - PB - Brasil* ■ The precise determination of the refractive index, as well as their dispersion, is a very useful information for optical applications and chemical analysis. In this work we demonstrate a high precision technique that uses a system of two Michelson interferometers to measure the refractive index of liquids. The interferometers are designed in a way that their moving