Volume 38 • Supplement 1 • July 200

European Biophysics Journal

with Biophysics Letters

25th Anniversary

7th EBSA European Biophysics Congress
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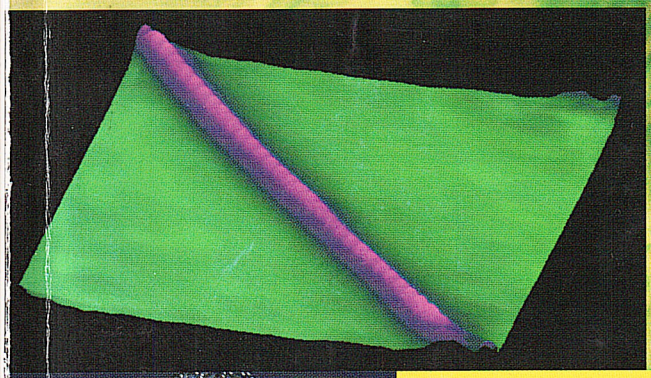
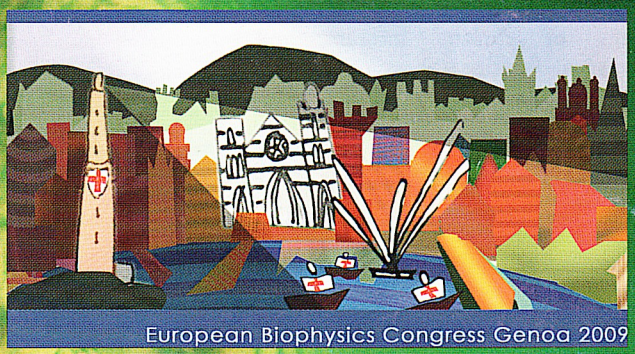
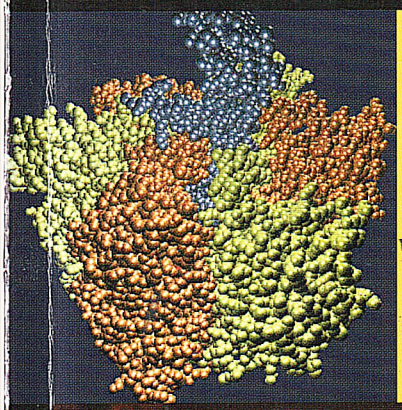
Abstracts







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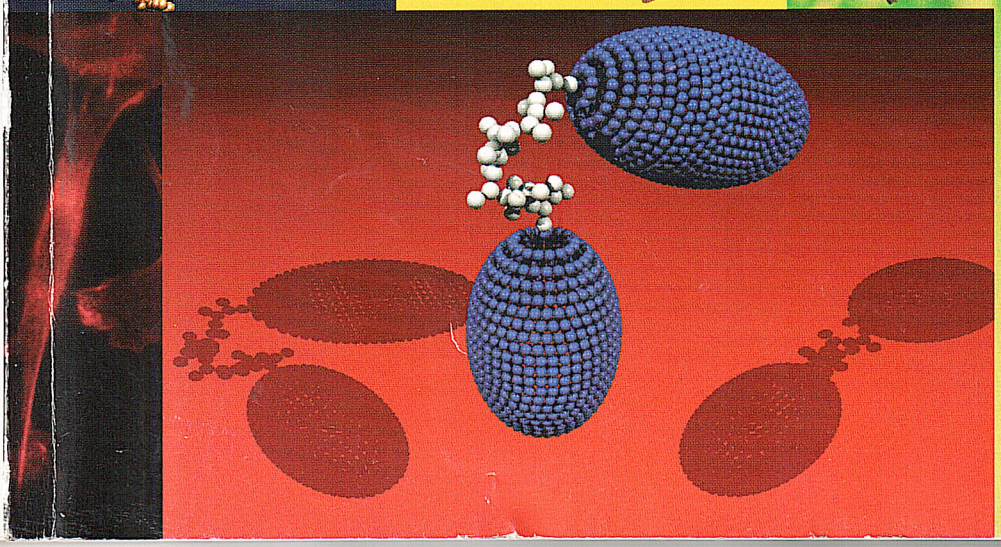

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Papers employing a distinctively biophysical approach at all levels of biological organisation will be considered, as will both experimental and theoretical studies. The criteria for acceptance are scientific content, originality and relevance to biological systems of current interest and importance. Principal areas of interest include:

- **Structure and dynamics of biological macromolecules**
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EBSA 2009

European Biophysics Congress Genoa
11th - 15th July 2009 Genoa, Italy

7^{th} EBSA

European Biophysics Congress

July 11^{th} – 15^{th} 2009, Genoa, Italy

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O-145

Fluorescence imaging for a MVAC chemotherapy resistance predicative test in human bladder cancer

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Multidrug resistance is a well known phenomenon which limits effectiveness in treating malignancy with chemotherapy by modifying the internalization and/or externalization flow of the drugs through the cancerous cells. Combined chemotherapies, such as MVAC, are therefore currently used in bladder cancer treatment. However, about 30% of patients do not respond this chemotherapy because of inherent or acquired drug resistance.
We developed a non invasive predicative test on urinary cells to estimate the chemotherapy effectiveness before treatment, based on the fluorescence emission of MVAC. We first studied the MVAC photophysical properties in solution and using five cell lines: a drug sensitive cancer cell line MGH-u1S, its multidrug resistant subline MGH-u1R, a not tumorigenic cell line SV-HUC-1, its tumorigenic counterpart MC-SV-HUC T-2 and a cell line from transitional cell carcinoma T24.
The results revealed a penetration and localization of the drug depending of the cell line type, allowing us to find a specific fluorescence signature for the identification of MVAC resistant cells. Similar data have been obtained for cytospined fixed culture cells and patients urinary cells.

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3D Correlative Light-Electron Microscopy approach to study cellular and molecular events

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Correlative light/electron microscopy (CLEM) is becoming increasingly frequent in molecular and cellular biophysics. We successfully applied the method to analyze the 3D structure of rough and smooth Russell bodies used as model systems. The major advantages of this approach are the following: (i) the ability to correlate several hundreds of events at the same time, (ii) the possibilitˆ to perform 3D correlation, (iii) the potential to immunolabel both endogenous and recombinantly expressed proteins at the same time and (iv) the effective combination of the high data analysis capability of FLM with the high precision-accuracy of transmission electron microscopy in a CLEM hybrid morphometry analysis. We have identified and optimized critical steps in sample preparation, defined routines for sample analysis and retracing of regions of interest, developed software for semi/fully automatic 3D reconstruction and defined preliminary conditions for an hybrid light/electron microscopy morphometry approach. The relevance of the presented approach lies in two important key elements, namely: the development of optical nanoscopy methods and the potentiality for exploring different correlative frameworks like optical nanoscopy vs. optical microscopy adding scanning force microscopy techniques.

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Modulating the response of single neurons and neuronal networks with biophysical stimuli

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During differentiation, cell processes create connections with other cells to form tissue capable of performing complex tasks. Biophysical constraints provide necessary inputs for cellular organization in living organism[1]. To better understand how biophysical conditions influence tissue development, it is necessary to bridge the gap between experiments on single cells and complex tissues[2,3]. To achieve this goal we pair optical tweezers with electrophysiology measurements[4]. By adopting neuronal networks as a biological model, neuronal signal transmission can be recorded either by patch-clamp electrophysiology or microelectrode arrays (MEAs). Dissociated neurons will be cultured on MEAs to record neuronal network activity at different sites of the network while applying spatio-temporally defined biophysical stimuli to individual neurons.

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P-148

Labeling of the isolated plant cell walls with CdSe Quantum dots

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Quantum dots (QDs) are semiconductor nanoparticles with increasing application as fluorescent markers in biology. We investigated structure of the cell walls of different species complexed with CdSe QDs using fluorescence microscopy, fluorescence spectroscopy and FTIR techniques. In the experiments we used the cell walls isolated from three distinct plant species: *Arabidopsis thaliana*, *Acer sp.* and *Prunus omorika*. We studied both unlabeled and CdSe-labeled cell walls. Fluorescence spectroscopy and microscopy were used for detection of QDs alone or complexed to the cell walls. Emission spectra were deconvolved using the Nelder–Mead algorithm in Matlab 6.5. We calculated approximate probability distribution (APD) for positions of spectral components maxima. There was certain difference between unlabeled cell walls and those complexed with QDs. The FTIR spectra also show some difference between the complexed and pure cell walls. The results show that structure was changed, but not significantly in reaction with CdSe QDs. These results are promising in context of use of QDs as labels in cell wall studies. The characterization of the complex of cell wall structure with QDs is a part of the study of nanoparticles application in investigations of plant materials.