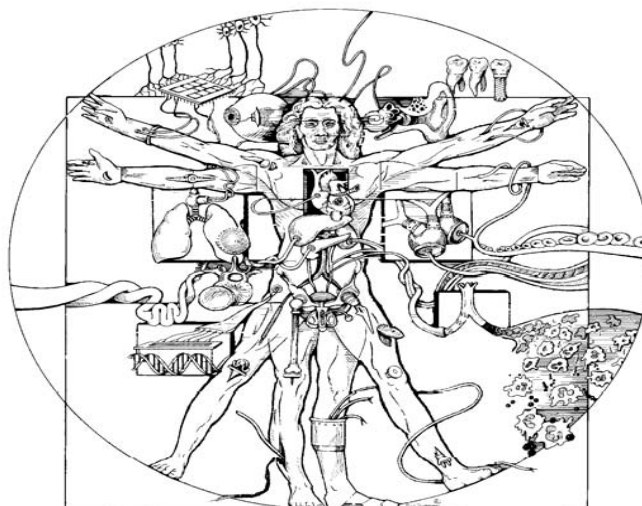


Biomedical Engineering Seminar



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“Highly Sensitive NanoParticles Modified Electrodes for Fast Diagnostics”

Abstract: Interest is increasing in exploring the unique properties and potential technological applications of various nanostructures. Catalysis is one of the most frequently studied applications of nanoscale assemblies. Nanoparticles also facilitate electron transfer and can be easily modified using a wide range of biomolecules and chemical ligands. Unique electric properties together with significant surface enlargement make the nanoparticles an important component in electrochemical sensing applications.

Here we present the implementation of nanoparticles in the detection of pathogens and diseases markers. We have used amperometric detection of enzymatic activities and have quantified optimized the effect of the nanoparticles on the obtained signals. The following examples will be discussed:

- Antibodies against Hepatitis C virus (HCV) were attached to carbon or gold electrodes modified with carbon nanotubes (CNT). The electrodes were then employed in electrochemical enzyme immunoassays for hepatitis C Virus (HCV). The viral antigen could be detected with high sensitivity and high reproducibility.
- The same format was employed in the detection of myocardial infarction markers. Anti C reactive proteins (CRP) were used to detect CRP level in human serum. Anti Lactic dehydrogenase 1 (LDH1) antibodies were used in LDH1 level. The fast detection of both markers is significant in the verification of heart failure.
- We have recently reported on sensitive and specific identification of several bacteria by amperometric monitoring of intrinsic or induced enzymatic activity of the target bacteria. This system was used in combination with CNT modified electrodes for the detection of the bacteria *M. Smegmatis*, a model system of *Mycobacterium Tuberculosis*.
- In light of the similarity and possible advantages of peptide nanotubes (PNT) as compared with CNT, we extended our studies to characterize the possible use of the diphenylalanine-based peptide nanotubes in electrochemical applications.

In summary, the possibility of enhancing the electrochemical activity and improving the selectivity of the nanotubes based electrodes offers novel perspectives for the development of sensors and biosensors having promising analytical performances. Combining biological specificity, electrochemical detection along with the electronic properties of nanotubes, enables nanoparticles-based extremely sensitive biosensors for diagnostics.

Monday, September 17, 2007

2:00 pm

Keating 103

Host: Urs Utzinger, Ph.D. (626-9281)

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