



Vás zve na seminář:

## NOVÉ ZPŮSOBY DETEKCE A ANALÝZY BIOMOLEKUL II

Semináře se zaměřují na využití moderních technologií pro analýzu biomolekul. Výsledky získané podporou projektu jsou zveřejněny ve zvláštním čísle časopisu Journal of Electrochemical Sciences.

### HIV BIOSENSORS – IS ELECTROCHEMISTRY THE RIGHT WAY?

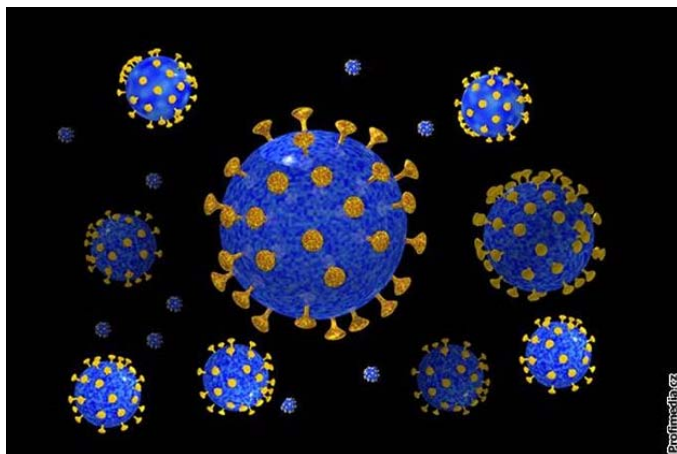
10:00 – 11:30

*Mgr. Ondřej Zítka, Ph.D.*

#### Anotace/Annotation

Although the HIV diagnosis is a highly reliable in developed world, and the success of highly active antiretroviral therapy (HAART) in HIV-infected patients has led to dramatic increase their life qualities, large problem in form of developing countries still exists. Because of expensiveness and time consumption of common HIV tests, new ways in diagnosis, offering rapid, cheap, and accuracy possibility are looking for. One of the most promising fields is electrochemistry, providing very good specificity, relatively low price, sensitivity, and possibility of miniaturization. Good sensitivity of electrochemical methods also facilitates the detection of HIV virions during the diagnostic window – the period when HIV antibodies are produced, but under detection limits of common diagnostic methods. In this review, the advantages and disadvantages of electrochemical HIV

biosensor are summarized. Moreover the potential of electrochemistry compared with other conventional methods is discussed.



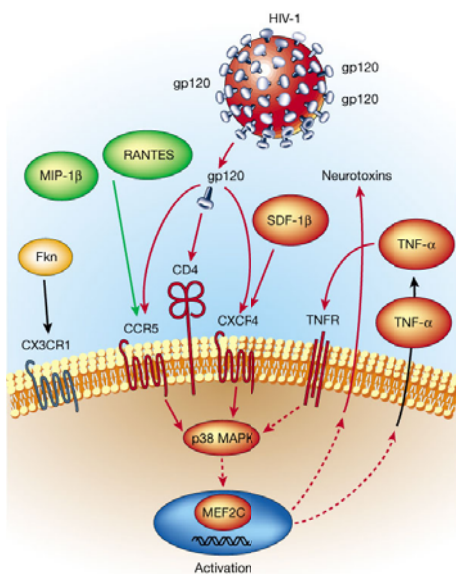
## SPEKTROSKOPICKÁ A ELEKTROCHEMICKÁ CHARAKTERISTIKA PROTEINU GP120

11:30 – 12:30

Mgr. Natalia Cernei, Ph.D.

### Anotace/Annotation

Human immunodeficiency virus (HIV) is a retrovirus that can lead to a condition in which the immune system begins to fail, leading to opportunistic infections. HIV primarily infects vital cells in the human immune system such as helper T cells (specifically CD4<sup>+</sup> T cells), macrophages and dendritic cells. HIV infection leads to low levels of CD4<sup>+</sup> T cells through three main mechanisms: firstly, direct viral killing of infected cells; secondly, increased rates of apoptosis in infected cells; and thirdly, killing of infected CD4<sup>+</sup> T cells by CD8 cytotoxic lymphocytes that recognize infected cells. When CD4<sup>+</sup> T cell numbers decline below a critical level, cell-mediated immunity is lost, and the body becomes progressively more susceptible to opportunistic infections. HIV was classified as a member of the genus Lentivirus, part of the family of Retroviridae. Lentiviruses have many common morphologies and biological properties. Many species are infected by lentiviruses, which are characteristically responsible for long-duration illnesses with a long incubation period. Lentiviruses are transmitted as single-stranded, positive-sense, enveloped RNA viruses. Upon entry of the target cell, the viral RNA genome is converted to double-stranded DNA by a virally encoded reverse transcriptase that is present in the virus particle. This viral DNA is then integrated into the cellular DNA by a virally encoded integrase so that the genome can be transcribed. Once the virus has infected the cell, two pathways are possible: either the virus becomes latent and the infected cell continues to function, or the virus



becomes active and replicates, and a large number of virus particles are liberated that can then infect other cells.

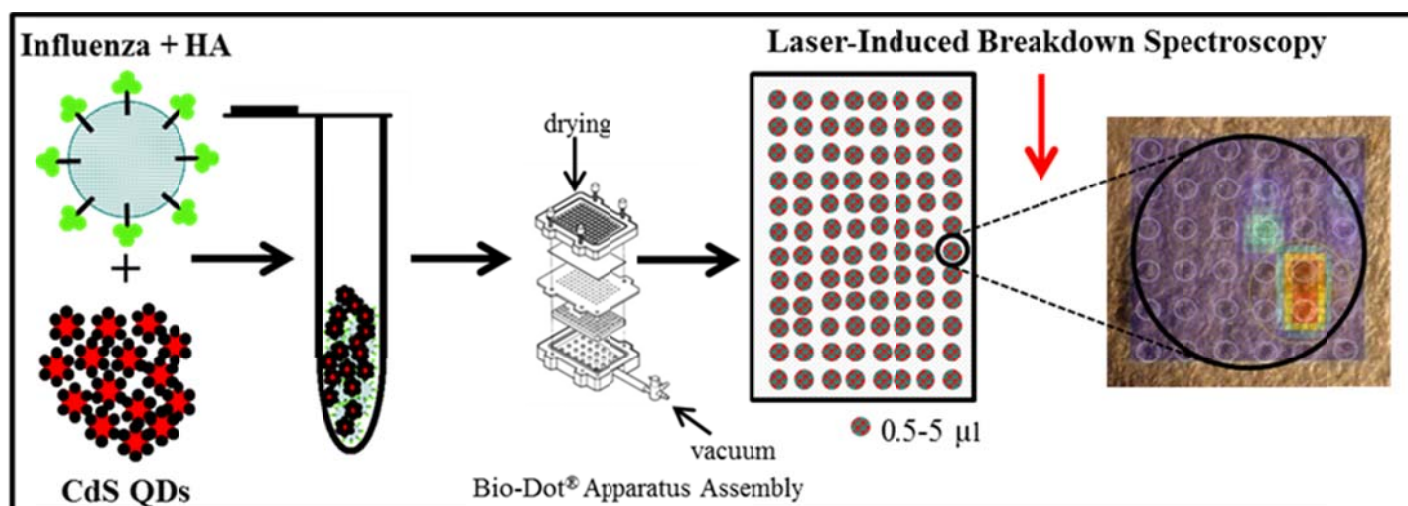
## ELEKTROCHEMICKÁ A SPEKTROSKOPICKÁ ANALÝZA - LIBS CHŘÍPKOVÉHO PROTEINU

12:30 – 13:30

Mgr. Marie Konečná, Ph.D.

### Anotace/Annotation

A non-luminescence method, Laser-Induced Breakdown Spectroscopy (LIBS) in double pulse configuration, has been developed for the spatial distribution mapping of cadmium after injection of CdS quantum dots (QDs) onto the carrier material. The best signal to noise (S/N) ratio and spatial resolution were achieved using the chromatographic paper as a carrier material and detection on emission line Cd (I) 508.58 nm. The detection limits of Cd at picomolar levels were obtained. As the real samples the influenza viral protein hemagglutinin (HA) complexes with Cd-containing quantum dots were detected at nanomolar levels. For the comparative measurements fluorescence detection and imaging were applied.





## AUTOMATICKÁ ANALÝZA HIV SEKVENCÍ NA TIŠTĚNÝCH ELEKTRODÁCH

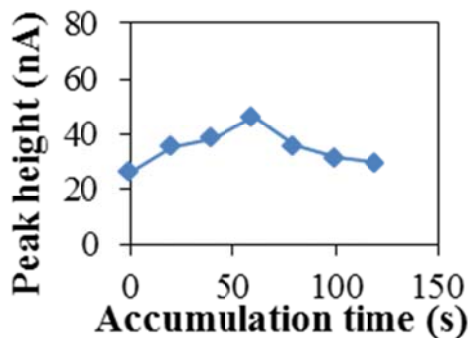
13:30 – 14:30

Ing. Jiří Kudr

### Anotace/Annotation

Globally, there are 33 million people living with HIV. The earliest symptoms of HIV infection occur when your body begins to form antibodies to the virus between six weeks and three months after infection with the HIV virus. Approximately, 22 million HIV tests are carried out every year in the US. Only by being tested for HIV can you know for sure if you have been infected. The most common method of diagnosing HIV infection is through a combination of tests that detect HIV antibodies in the blood, these include enzyme linked immunosorbent assay (ELISA), and Western Blot tests. These tests are costly, slow and laborious. Furthermore, since these tests must wait

for the development of antibodies for detection, people in early stages of the disease can still be carriers but have a negative HIV antibody test. Clearly, better early diagnostic tools are needed to prevent further spread of disease.



**21. 02. 2014, začátek v 10:00 -14:30 h**  
 Laboratoř metalomiky a nanotechnologií  
 Kontakt: [kizek@sci.muni.cz](mailto:kizek@sci.muni.cz)

