

# **Seminář odd. 26**

## **Tenkých vrstev a nanostruktur**

*Fyzikální ústav AVČR, Cukrovarnická 10, Praha 6*

*datum: 6. 11. 2012 úterý*

*čas: 10:00*

*mítnost: knihovna, budova A, 1.p.*

### **TÉMA**

## **In vitro biosensing with semiconductor-based platform**

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We are studying and developing biosensing techniques in order to analyze and monitor simply and easily biological phenomena such as DNA recognition events and cell functions which are reenacted in vitro as same as in vivo possible. Particularly, we focus on the direct detection of ions or ionized molecules with charges, because most of biological phenomena are closely related to ionic or ionized molecular behaviors such as sodium or potassium ions through ion channel at cell membrane which are based on cell-cell communication for example, and DNA molecules also have intrinsic molecular charges based on phosphate groups. In order to detect directly ion or molecular charges, we introduce the semiconductor-based biosensing devices. We utilize the principle of field effect based on semiconductor device technology (metal-oxide-semiconductor (MOS) transistor) with “Biological-Switch-Gate” concept. Most of biomolecules such as DNA, and protein or ions through ion channel at cell membrane electrostatically interact with electrons in silicon-based semiconductor across the thin gate insulator resulting in the change of drain-source current at the channel in silicon, because they have intrinsic charges in aqueous solutions. Thus, we can detect easily and noninvasively biological phenomena such as DNA molecular recognition events, antigen-antibody reaction, and cell behaviors. [Angewandte Chemie International Edition, 45, 2225 (2006)]

odborný garant: *RNDr. Bohuslav Rezek, Ph.D.*