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*VABILO NA PREDAVANJE*
*V OKVIRU DOKTORSKEGA ŠTUDIJA*
*KEMIJSKE ZNANOSTI*

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z naslovom:

# Some new trends in the development of electrochemical sensors and biosensors

**v sredo, 28. marca 2018 ob 15:00 uri**
v predavalnici 1 v 1. nadstropju Fakultete
za kemijo in kemijsko tehnologijo, Večna pot 113

*Vljudno vabljeni!*

**Povzetek:**

Nano-sized materials as part of the receptor (recognition layer) of sensors have been exerting an enormous impact on the development of electrochemical sensors leading to a new renaissance in electroanalysis recently. Due to the high surface area often in combination with catalytic effects nanoparticles are extremely suitable modifiers of electrode surfaces resulting in low to ultra-low detection limits and improved analytical performance. Strategies for the development of chemical sensors and biosensors will be shown together with illustrative examples.
Sensors for inorganic analytes have attracted again high interest [1, 2]; in particular nanoparticulate composites may yield good results for the detection of metal ions competitive with mercury electrodes [3]. Organic analytes make up the majority of target species of electrochemical sensors; the analytes can be detected by direct electron transfer, by electrocatalysis [4] or by biosensors.
Biosensors seem particularly interesting, often offering high specificity of the biological entity towards the substrate. Enzyme-based biosensors still constitute the majority of research topics in the sensor literature. Here mainly oxidoreductases are exploited, where wiring of enzymes to obtain direct electron transfer with the active center (third generation oxidase sensors) gets increasingly important [5]. Occasionally hydrolases may assist the detection of analytes (herbicides, pesticides, heavy metals) [6]. Geno- and cytosensors are a rapidly emerging field with promising future.

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2. Dalibor Stankovic, Eda Mehmeti, Janez Zavasnik, Kurt Kalcher (2016). *Determination of nitrite in tap water: a comparative study between cerium, titanium and selenium dioxide doped reduced graphene oxide modified glassy carbon electrodes*. **Sensors and Actuators B 236**:311-317
3. Sudkate Chaiyo; Eda Mehmeti; Kristina Žagar; Weena Siangproh; Orawon Chailapakul; Kurt Kalcher (2016). *Electrochemical sensors for the simultaneous determination of zinc, cadmium and lead using a Nafion/ionic liquid/graphene composite modified screen-printed carbon electrode.* **Analytica Chimica Acta** 918:26-34.
4. S. Chaiyo, E. Mehmeti, W. Siangproh, T.L. Hoang.,H.P. Nguyen, O. Chailapakul, K. Kalcher (2018). *Non-enzymatic electrochemical detection of glucose with a disposable paper-based sensor using a cobalt phthalocyanine–ionic liquid–graphene composite*. **Biosens. Bioelectron***.* 102:113–120).
5. Eda Mehmeti, Dalibor M. Stanković, Sudkate Chaiyo, Janez Zavasnik, Kristina Žagar, Kurt Kalcher (2017). *Wiring of glucose oxidase with graphene nanoribbons: an electrochemical third generation glucose biosensor*. **Microchim Acta** 184:1127–1134.
6. A. Samphao, P. Suebsanoh, Y. Wongsa, B. Pekec, J. Jitchareon, K. Kalcher (2013). *Alkaline Phosphatase Inhibition-Based Amperometric Biosensor for the Detection of Carbofuran*. **Int. J. Electrochem. Sci. 8**:3254 - 3264