



DZIEKAN
WYDZIAŁU CHEMII UAM
ORAZ
ZAKŁAD ZIEM RZADKICH



zapraszają na seminarium wydziałowe
w ramach projektu IDUB, na którym

prof. Zdeněk Farka

wygłosi wykład pt.



***“Advanced Immunochemical Biosensors and Assays:
From Label-Free to Single-Molecule Detection”***

Seminarium odbędzie się **18 stycznia 2023 roku**

o godzinie **9:30**

w **Sali Rady Wydziału, Wydział Chemii UAM**

ABSTRACT

The rapid detection of low analyte concentrations is of fundamental importance in many fields, including clinical diagnostics, food control, and environmental screening. Among many analytical techniques, immunoassays and immunosensors are gaining attention due to the high specificity provided by antibodies and excellent sensitivity provided by different readout techniques. We have employed immunosensors for the detection of a wide range of analytes, from small molecules, through proteins, to bacteria, utilizing various kinds of transducers and labels. We have developed label-free sensors for point-of-care detection of Salmonella by electrochemical impedance spectroscopy and for screening of aerosolized biological warfare agents by quartz crystal microbalance. The use of catalytic labels was demonstrated by enzymatically-catalyzed precipitation for signal enhancement in surface plasmon resonance and by catalytic Prussian blue nanoparticles as a promising alternative to enzymes. We have also developed assays based on luminescence labels, focusing especially on photon-upconversion nanoparticles (UCNPs). The upconversion-linked immunoassays were used to detect pharmaceutical diclofenac, mycotoxin zearalenone, and honeybee pathogen *Melissococcus plutonius*. The low background and high photostability make UCNPs a powerful tool for detecting single molecules. We have developed an optical approach for visualizing individual UCNPs and applied it for the sensitive detection of the cancer biomarker prostate-specific antigen. Finally, the unique optical properties make UCNPs suitable for cell imaging, which was demonstrated by labeling HER2 biomarker on breast cancer cells.



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