Development of MIP-Modified Gold Chips for Electrochemically Assisted Surface Plasmon Resonance Sensing

Momina Islam[1,†], Magdalena Wójcik[1], Maciej Cieplaka[1],Piyush Sindhu Sharma[1]

[1]Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44/52, 01-224, Warszawa, Poland
† corresponding author's email: mislam@ichf.edu.pl

Electrochemically assisted surface plasmon resonance (E-SPR) combines the optical sensitivity of traditional SPR with electrochemical control, enabling the development of advanced hybrid sensing platforms. This involves the use of Molecularly Imprinted Polymers (MIPs), structured as thin films or nanoparticles, deposited on gold SPR chips. These MIPs act as synthetic recognition elements with high selectivity for target analytes. Upon analyte binding, the MIP layer induces changes not only in the refractive index—detected via SPR—but also in the electrochemical behaviour of redox-active species [1]. This dual modulation leads to a new form of transduction, where both optical and electrochemical signals respond synergistically to molecular recognition events [2]. E-SPR platforms incorporating MIP layers hold significant promise for highly selective and sensitive chemosensing and biosensing applications, including clinical diagnostics, environmental monitoring, and food safety.

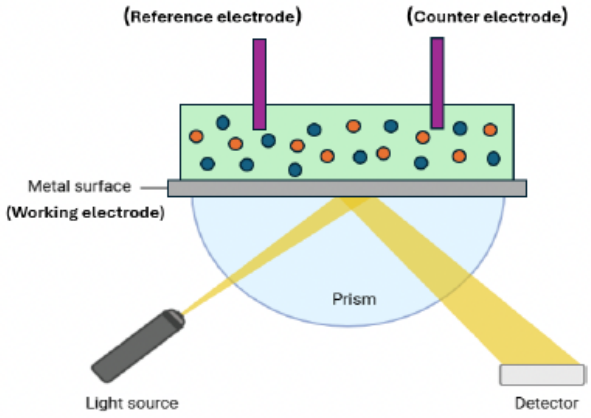

Figure 1: Electrochemically assisted SPR for sensing

Acknowledgments

The financial support from the National Science Centre, Poland in the form of grant OPUS Project No. 2022/47/B/ST5/02337 is acknowledged

References

[1] Lach, P., et al., *Self-reporting molecularly imprinted polymer with the covalently immobilized ferrocene redox probe for selective electrochemical sensing of p-synephrine.* Sensors and Actuators B: Chemical, 2021. **344**: p. 130276.
[2] Wang, S., et al., *Electrochemical surface plasmon resonance: basic formalism and experimental validation.* Analytical chemistry, 2010. **82**(3): p. 935-941.