**Transparent electrodes and semiconductor materials for electrocatalysis applications**

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Electrochemical catalysis is an important part of research in the modern world due to its various applications. Electrocatalysis is an important part of research for application in the development of sensors for use in environmental chemistry and biomedical research, development of capacitors, batteries, energy conversion and conservation, waste water treatment. The development of nanotechnology has significantly contributed to the accelerated development of these areas. A very important place in each of these fields of research is occupied by transparent materials and semiconductor nanomaterials. Electrodes based on transparent nanomaterials are an indispensable part of the development of electrochemical sensors[1]. Indium tin oxide (ITO) electrode forms an important basis for the construction of biosensors based on electrocatalysis and their application in biomedical research. In addition to this application, the electrocatalytic degradation of chemicals of emerging concern (CEC) and persistent and mobile organic chemicals (PMOCs) based on these electrodes is very common today. In addition to ITO, carbon nanostructures, other metal oxides, MXenes, polymer materials and nanocomposites also play a significant role in this field. Semiconductor nanomaterials possess unique optical, electrical, thermal and catalytic properties. Therefore, they have attracted great interest in the construction of electrochemical (bio)sensors and the development of technologies for water purification by electrocatalysis[2]. The catalytic properties of semiconductor nanomaterials can reduce the overvoltage of some important reactions in electrochemical catalysis, or provide reversibility for redox reactions that are irreversible on traditional electrodes, which can sometimes further improve electrochemical reactions. Their application in the field of electrocatalysis is today indispensable for applications in biomedicine and environmental chemistry.

[1] Noriega et al., ACS Applied Materials & Interfaces 16 (2024) 6569-6578; [2] Chaniotakis et al., Analytica Chimica Acta 615 (2008) 1-9

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