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Editorial

Nanomaterials as the powerful catalysts in electroanalysis

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In the rapidly evolving landscape of electroanalysis, the role of nanomaterials has emerged as a transformative force, propelling the field to the upper stages. This special issue delves into the groundbreaking contributions of nanomaterials, exploring their potential as catalysts and their impact on shaping the future of electroanalytical techniques.

Nanomaterials, with their unique physicochemical properties, have proven to be game-changers in electroanalysis. From enhanced conductivity to increased surface area, with their superior physicochemical properties, these materials provide an ideal platform for boosting electrochemical reactions. The special properties of materials at nanoscale level attract the huge attention of industry and academia which is reflected in ever-increasing number of publications published in the prestigious international journals. This special issue compiles cutting-edge research that showcases how various nanomaterials, such as metal nanoparticles, nanotubes, and hybrid nanocomposites, serve as potent catalysts, unlocking new possibilities in the design and optimization of electroanalytical methods.

Engineering of nanomaterials helps in overcoming many challenges faced in many applications. The electronic structure of nanomaterials and its wide surface area open a great potential in improving the catalytic performance of traditional catalysts toward many chemical and electrochemical processes in monitoring different substances in biological or ecological environments. Also, many electrochemical energy storage and conversion systems take advantage of nanomaterials to speed up the reaction rates, decrease overvoltage, and enable fast and easy penetration of the intercalating ions in the layered structures of electrode materials.

The articles featured in this special issue span a wide range of applications, highlighting the versatility of nanomaterials in electroanalysis. Researchers have explored the use of nanocatalysts in sensing and detection of biomolecules, environmental monitoring, energy storage, and beyond. The special issue includes eight papers addressing new production methods and applications of nanomaterials, mostly in the electroanalysis of various substrates. A review paper by Dodevska *et al.*

gives view of advances of nanomaterials in areas of electrode modification, successful strategies for signal amplification, and miniaturization techniques used in electroanalytical devices for cosmetics control and safety. The analysis of food products has also gained a special attention in two papers. Dehdashtian *et al.* used single wall CNTs modified carbon paste electrodes for analyizing tert-butylhydroquinone in food products. Arab *et al.* prepared the composite of ZnO/SWCNT for the determination of caffeic acid in wine samples. Pharmaceutical applications of nanomaterials for the determinations of lorazepam, methionine, hydrazine and N-acetylcysteine were also addressed in this special issue. Finally, in the paper by Elagib *et al.* the application of heteroatom-doped carbon nanotubes to create a porous structure for facilitating oxygen reduction and increase the supercapacitive properties of electrodes.