

Porous carbon based materials for electrochemical sensing of pesticides

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The extensive use of pesticides has resulted in their emergence in water and food products which is a growing issue. The hazardous nature of pesticides has triggered the need for their monitoring within the environment. The conceptualization of reliable electrochemical sensors for the on-site quantification of pesticide concentrations stands as an alternative to conventional chromatographic techniques, which possess characteristics of being time consuming, costly and reliant on skilled personnel. Electrochemical sensors are often designed as electrodes based on carbon materials such as MWCNTs, graphene, graphite, microspheres, etc and some notable examples are described in this presentation. Herein, two novel electrochemical sensors for pesticides fabricated through the chemical deposition of Pt and MoO₂ nanoparticles onto MWCNTs are presented in detail along with Ag- and Pt-supported carbon microspheres and Co- and Ni-doped ordered mesoporous carbon for other electrochemical applications. Addition of metal nanoparticles is a key topic responsible for enhancement of electrode response and sensitivity. To investigate the structural characteristics of the porous carbon electrode materials, various analytical techniques such as Raman and FT-IR spectroscopy, field emission scanning electron microscopy (FE-SEM), high-resolution transmission electron microscopy (HR-TEM), X-ray crystallography, and the others were employed and discussed. Analyzed materials evidenced excellent reproducibility, wide concentration range with robust linear relationship, and low limit of quantification when applied as specific electrodes for sensing ppb levels of pesticides.

CV:

Milan Momcilovic holds a degree in Chemistry from the University of Niš, Serbia since 2012. His PhD thesis is related to porous carbon based materials designed for wide range of applications in water purification and electrochemistry. From 2011 until 2023, he was engaged at the “Vinča” Institute of Nuclear Sciences – National Institute of the Republic of Serbia as a researcher whose work was dedicated to synthesis of various forms of micro and mesoporous carbon based materials. At the moment, he is employed at the Faculty of Sciences and Mathematics of University of Niš as the Senior Research Associate. His scientific interest covers wide research fields with several types of carbon materials involved including MWCNTs, graphene, ordered mesoporous carbons, carbon spheres, aerogels, and biochars, mainly investigated for specific applications in sorption of metals and organic pollutants from aqueous media, electrocatalysis and electrochemical sensing.