J Material Sci Eng 2019, Volume 8
DOI: 10.4172/2169-0022-C6-141

Construction of nanostructured binary metal oxides for electrocatalysis and biosensors

Shen-Ming Chen
National Taipei University of Technology, Taiwan

Development of nanostructured materials with superior morphology by simple methodology has incessantly received a significant scientific interest due to their unique physical and chemical properties for the applications in electrochemical sensors and biosensors. Binary metal oxides, particularly, metal molybdates and tungstates possess enormous attentions due to their high electrical conductivity, excellent structural stability and reproducibility compared to single one. In this regard, we fabricated different metal molybdates and tungstates with well-defined morphology. We utilized as chemical sensors and biosensors in real environment and biological fluids. For occasion, two-dimensional plate-like tin molybdate was fabricated via simple co-precipitation route and employed as an electrochemical for the detection of neurotoxicity drug clioquinol. Highly sensitive and selective electrochemical sensor for the identification of postharvest scald inhibitor diphenylamine was developed using seed-like strontium molybdate modified electrode. A flower-like neodymium molybdate was prepared and studied towards the selective electrochemical sensor for the antibiotic drug nitrofurantoin. The CoWO4 nanospheres was prepared by low temperature chemical synthesis method and evaluated towards the sensitive detection of glucose biosensor. A novel nickel tungstate was synthesized using simple hydrothermal treatment without using any surfactant or templates and investigated for its electrochemical properties for the detection of glucose biosensor. Well-crystalline 2D cerium tungstate nanosheets were prepared by a simple wet chemical approach and used as an excellent electron mediator for the fabrication of nitrite sensor. A novel ruthenium nanoparticles decorated tungsten oxide based sensor was developed and its catalytic behavior was demonstrated towards the oxidation of hydrazine. The aforementioned nanomaterials were furnished a good electrocatalytic activity with appreciable stability towards the chemical sensors and biosensors when compared with the previously reported sensors. The analytical parameters such as linear response range, sensitivity, limit of detection and reproducibility of the devices also been carried out and compared with the current state of the art.