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Copper oxide nanostructures for electrochemical sensing – facet-dependent electrochemical properties

To design the shape of nanocrystals in one of the most important issues in nanoscience, chemistry, and physics owing to the close correlations between the surface morphology and the surface energy and chemical reactivity. Preferential adoption of-of organic and inorganic additives on certain crystallographic surfaces offer a good opportunity to tune and control the surface activities of nanomaterials. The ability to understand, predict and control of exposed surfaces is of critical importance to elucidate and explore shape-dependent chemical and physical properties. Cuprous oxide Cu_2O is a p-type semiconductor, which can be operated at relatively low temperatures. It posses high stability and good electrocatalytic characteristics. The conductivity of Cu_2O is mainly determined by the hole carrier density of the inter-granular contact region. Moreover, materials based on copper are the most evolving group due to their redox pair Cu_2+/Cu_3+. Presented work aims to investigate the influence of the copper oxide nanostructures with well-defined faces towards their electrochemical sensing activity. Different morphologies of Cu_2O nanocrystals were synthesized by a typical wet-chemical technique in the presence of various capping/reducing agents. The morphology of obtained materials was analyzed by SEM observation. The XRD, FTIR and Raman spectroscopy measurements were carried out for phase analysis. The surface properties were determined by DLS and zeta potential measurements. Electrochemical behavior towards glucose, hydrogen peroxide, and hydrazine detection was investigated by cyclic voltammetry.

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Biography

A. Kusior received her MSc in a filed of materials science and PhD in chemistry from AGH University of Science and Technology, Kraków, Poland in 2015. Since 2015 she has been working as Assistant at Faculty of Materials Science and Ceramics at AGH. Her scientific research concern the physicochemical properties of nanomaterials for photoelectrochemical and sensing applications. She has published more than 15 papers in reputed journals.