Surface engineering as a powerful tool to improve the mechanism of sensing

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The nature of material/liquid and/or material/gas interface affects the unique physico-chemical properties of the materials. Materials with different shapes and various exposed surfaces exhibit different surface energies which determine their adsorptive properties. New approaches to particle synthesis entail an unusually diverse spectrum of particle anisotropy, including uncommon shapes and/or surface chemistry.

Sorption processes can be divided into three categories: adsorption, absorption and ion exchange. In this group of physical and/or chemical processes, the first one is the most important. Adsorption is a phase transfer process that is commonly used to remove substances from various media (gas or liquid) or to detect their presence. Its general definition describes it as an accumulation of chemical species from a medium (gas or liquid) at the surface.

The ability to understand, predict and control the exposed surfaces is of critical importance to elucidate and explore shape-dependent chemical and physical properties.

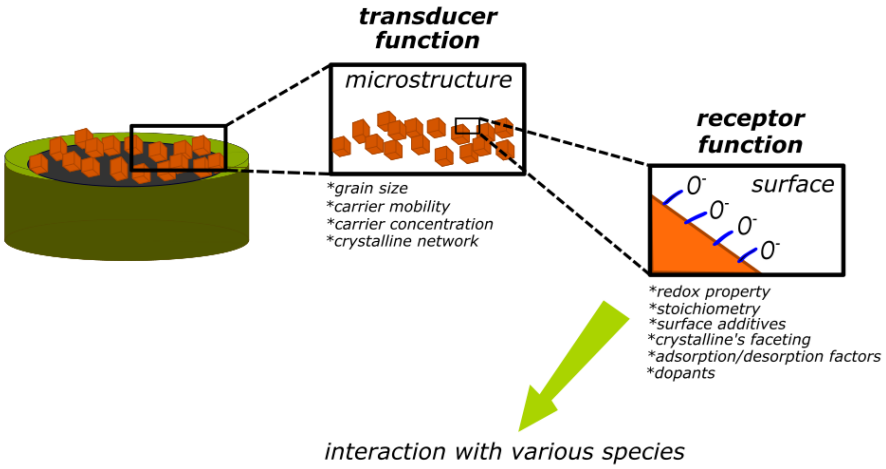

Fig 1. Schematic illustration of transducer and receptor functions as well as physicochemical and material properties of a semiconductor.

Thiswork aims to investigate the influence of variously shaped copper oxide-based nanostructures on their electrochemical sensing activity. Copper oxide crystals with well-defined facets, as well as anisotropically modified Cu_2O-SnO_2, Cu_2O-Cu_2S and Cu_2O-SnS_2 were synthesized by a typical wet-chemical technique in the presence of different capping/reducing agents. Kirkendall effect was used for the chemical transformation of copper oxide with well-defined facets. The morphology of the obtained materials was analyzed by scanning electron microscopy, SEM. X-ray diffraction, XRD, studies were carried out for phase analysis. The surface properties were determined by dynamic light scattering, DLS, and zeta potential methods. Cyclic voltammetry was applied to analyze the electrochemical behavior of modified carbon glassy electrodes by obtained powders towards various biomolecules.

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