

Nano-sized metallic clusters for bio-applications

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Abstract

Electrochemically synthesized nano-meter-sized clusters in the range of 2 to 6 nm will be presented. Using an electrochemical method palladium clusters and bimetallic clusters (PdMg, PdNi and PdFe) were prepared. The preparation was performed by electrochemical method where a simple two electrodes cell is used; to prevent undesired agglomeration the clusters were stabilized in matrix such as: surfactant shell e.g. tetra-octyl- ammonium bromide which is used as electrolyte and stabiliser, or polymers matrix as Teflon AF and PMMA.

Size and structural determination of these nano-sized particles will be presented. The characterization was done using x-ray diffraction (XRD), high resolution transmission electron microscopy (HRTEM) and Extended X-Ray Fine Absorption Structure (EXAFS).

The utilization of these nano-sized clusters in bio-applications such as: hydrogen storage for renewable energy, anti-bacterial efficiency and in water/wastewater treatment will be discussed.

Results on the hydrogen uptake, storage, behaviour in nano-sized metallic clusters; using volumetric measurements, gravimetric measurements will be presented.