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P.S.C.5.

AMINO-FUNCTIONALIZED CARBON NANOTUBES AS SUPPORT FOR Pt NANOCATALYST

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Multi-walled carbon nanotubes (CNTs) were used as a supporting material for Pt nanoparticles prepared by the microwave-assisted polyol method. The CNTs were pretreated by the chemical oxidation (o-MWCNT) followed by the modification by ethylenediamine (e-MWCNT). The Pt loading of Pt/o-MWCNT was only 2 mass % while the loading of Pt/e-MWCNT was 20 mass%. The investigation by transmission electron microscopy revealed that the mean diameter of Pt particles in Pt/e-MWCNT is 2.5±0.5 nm and that their distribution on the support is homogenous with no evidence of pronounced particles agglomeration. Cyclic voltammetry of Pt/e-MWCNT thin film indicated clean Pt surface with well-resolved peaks characteristic for polycrystalline Pt.

P.S.C.6.

INFLUENCE OF HEATING RATE ON TWO-STEP SINTERING BEHAVIOUR OF DIFFERENT HYDROXYAPATITE NANOPOWDERS

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Producing of dense nanostructured calcium phosphate-based bioceramics represents a challenging issue in biomaterial science. High volume fraction of energetically rich grain boundaries contributes to improved attachment of chemical species, which are important in the processes of bone tissue regeneration. Beside that, nanostructured ceramics exhibited better mechanical properties due to changed fracture path. The process of presureless sintering is the most compatible route for industrial fabrication of dense bioceramic materials, but it is often connected with accelerated grain growth in final sintering stage. In the method of two-step sintering (TSS) the difference between kinetics of grain boundary diffusion and grain boundary migration is used to obtain almost full dense, nanostructured ceramics. However, designing of proper sintering parameters is very important in every sintering technique employed.

In this study, hydroxyapatite nanopowders were synthesized by different methods, precisely, chemical precipitation and hydrothermal processing of precipitate. The prepared powders were pressed in pellets and heated with different heating rates (2, 5, 10 ºC/min), with short isothermal dwell at certain temperature range. From that shrinkage curves the appropriate conditions were selected to design TSS experiments. The impact of heating rate on final density, phase composition, average grain size and microstructural uniformity is discussed. Furthermore, mechanical properties were determined.