World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:9, No:07, 2015

# Ultrasound-Assisted Sol – Gel Synthesis of Nano-Boehmite for Biomedical Purposes

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**Abstract :** Among many different sol – gel matrices only alumina can be successfully parenteral injected in the human body. And this is not surprising, because boehmite (aluminium oxyhydroxide) is the metal oxide approved by FDA and EMA for intravenous and intramuscular administrations, and also has been using for a longtime as adjuvant for producing of many modern vaccines. In our earlier study, it has been shown, that denaturation temperature of enzymes entrapped in sol-gel boehmite matrix increases for 30 – 60 °C with preserving of initial activity. It makes such matrices more attractive for long-term storage of non-stable drugs. In current work we present ultrasound-assisted sol-gel synthesis of nano-boehmite. This method provides bio-friendly, very stable, highly homogeneous alumina sol with using only water and aluminium isopropoxide as a precursor. Many parameters of the synthesis were studied in details: time of ultrasound treatment, US frequency, surface area, pore and nanoparticle size, zeta potential and others. Here we investigated the dependence of stability of colloidal sols and textural properties of the final composites as a function of the time of ultrasonic treatment. Chosen ultrasonic treatment time was between 30 and 180 minutes. Surface area, average pore diameter and total pore volume of the final composites were measured by surface and pore size analyzer Nova 1200 Quntachrome. It was shown that the matrices with ultrasonic treatment time equal to 90 minutes have the biggest surface area 431 ± 24 m2/g. On the other had such matrices have a smaller stability in comparison with the samples with ultrasonic treatment time equal to 120 minutes that have the surface area 390 ± 21 m2/g. It was shown that the stable sols could be formed only after 120 minutes of ultrasonic treatment, otherwise the white precipitate of boehmite is formed. We conclude that the optimal ultrasonic treatment time is 120 minutes.

**Keywords :** boehmite matrix, stabilisation, ultrasound-assisted sol-gel synthesis
**Conference Title :** ICNN 2015 : International Conference on Nanotechnology and Nanomedicine
**Conference Location :** Prague, Czechia
**Conference Dates :** July 09-10, 2015