113-013

SYNTHESIS AND ANTIMICROBIAL EVALUATION OF NANOSTRUCTURES ZrO2:AG AGAINST STAPHYLOCOCCUS AUREUS BY HYDROTHERMAL METHOD

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Nanostructures of zirconia (ZrO2) has shown great prominence in the area of advanced materials and shows excellent properties such as chemical stability, mechanical strength, electrical and optical properties. When certain metals are supported on the compound, such as Fe, Ag, Au and Al, a potentiation of some properties, such as bactericide and fungicide can occur. Thus, this work deals with the synthesis and characterization of ZrO2 and ZrO2:Ag (1% and 10 % of Ag) nanostructures and the study of the influence of the antimicrobial activity against Staphylococcus aureus. X-ray powder diffractograms of the zirconia and silver with zirconia shown the formation of well defined peaks of tetragonal zirconia in all the samples. Although the ZrO2:Ag (10 % of Ag) shown the characteristcs peaks of cubic silver, these peaks do not appear in ZrO2:Ag (1 % of Ag) due to the small amount of silver in comparation with zirconium. The crystal size was estimated by the Scherrer equation and the calculated values for zirconia were 12.84, 12.27 and 12.61 nm for ZrO2, ZrO2 : Ag (1%) and ZrO2 : Ag (10%) respectively and the silver crystal size was 8,09 nm. Diffuse reflectance of the silver particles shown a broad plasmon band at 405 and 424 nm for the ZrO2 : Ag (1%) and ZrO2 : Ag (10%). Antimicrobial assay demonstrated that ZrO2 showed a bacteriostatic effect (61 %) and the inclusion of the silver in the ZrO2 matrix enhanced this effect to 65-72 %. Both particles with different silver content shown similar effect {[ZrO2:Ag 1%] = [ZrO2:Ag 10%]>[ZrO2]}.