World Academy of Science, Engineering and Technology
International Journal of Electrical and Information Engineering
Vol:11, No:05, 2017

Sonochemical Zinc Oxide and Layered Hydroxy Zinc Acetate Synthesis in Fenton-Like Reactions

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Abstract : Zinc acetate solution is sonicated at high power in water and in ethanol in the absence and presence of various peroxides. In the absence of peroxides, the products are zinc oxide and layered hydroxy zinc acetate in water and in ethanol, respectively. Layered basic zinc acetate are prepared for the first time using sonochemical methods. The addition of peroxides alters the reaction mechanisms. In water, insoluble peroxides produce zinc oxides while the water soluble peroxide, i.e.hydrogen peroxide, completely destroyed the structure and casted a doubt on the accepted peroxide initiated mechanism of reactions. In ethanol,peroxide addition caused the reaction mechanism to change and some oxide formation is observed. The reaction mechanism is sensitive to water/ethanol amounts as well as the peroxide to zinc ion mole ratio.Thin zinc oxide wafers (ca. 30 nm) with band gaps of 3.24 eV were obtained.

Keywords : ultrasound, zinc oxide, hydroxy zinc acetate, fenton, peroxide initiation
Conference Title : ICUA 2017 : International Conference on Ultrasonics and Applications
Conference Location : Amsterdam, Netherlands
Conference Dates : May 14-15, 2017