Modified Sol-Gel Synthesis of $ZnTiO_3$ and its Antibacterial Properties

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From industrial perspective zinc titanate ($ZnTiO_3$) is an attractive material due to its various applications as paints pigments, fusion cast thermistors, sorbent, microwave dielectrics, dielectric resonators, catalysts, etc. It is well known that ZnO and TiO_2 posses antibacterial properties, but there is no data concerning the antibacterial properties of $ZnTiO_3$. This provokes our interest to study that compound in order to check these properties. There are several methods for preparing $ZnTiO_3$ powders, including conventional solid state reactions, mechanochemical activation and several variants of sol-gel technique [1, 2]. During recent years, the sol-gel method has been regarded as an advantageous method for synthesis of nano-powders. This method was selected in order to overcome the $ZnTiO_3$ decomposition (~ 945^0C).

The present study is based on a modified sol-gel method. The $Ti(OEt)_4$, Zn-nitrate and Zn-acetate were used as main precursors. The phase formation and structural transformation at every step of the synthesis routes were followed by X-ray phase analysis and IR spectroscopy. The agglomeration tendency and the crystals size were determined by Scanning Electron Microscopy. Submicron powders of pure $ZnTiO_3$ were obtained by heating up to 550^0C. It was established that $ZnTiO_3$ possesses photocatalytical activity against Malachite green organic dye. For first time it was shown that submicron powders of $ZnTiO_3$ possess strong antimicrobial activities against high concentration of *Escherichia Coli* bacteria.

References

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