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SYNTHESIS OF ZnO IN AQUEOUS MEDIA. INFLUENCE OF SEVERAL SYNTHESIS PARAMETERS ON PARTICLE SIZE AND SHAPE

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ZnO is a material widely studied in recent years due to its properties and applications. ZnO is a large gap band (3.3-3.6 eV) n-type semiconductor and shows both photoconductivity and photocatalytic activity. ZnO nanoparticles also show size dependent electronic and optical properties. For these reasons, ZnO nanoparticles have been widely used for catalytic, electronic and luminescent devices, pigments and components for the pharmaceutical and cosmetic industries.
In the present work, nanoparticles of ZnO have been synthesized by precipitation from aqueous solutions using $Zn(NO_3)_2$ as precursor and NaOH as a base. The precipitation experiments have been performed in a small batch reactor. Injection of the reactant solutions has been accomplished by means of peristaltic pumps. The influence of several experimental parameters, such as concentration of the reactants, temperature, pH and stirring rate, on the size and shape of the final particles has been systematically investigated. The morphology changes from ellipsoidal particles to star-like particles and to spheres. The size can be tailored in the range 100 to 2000 nm. All these information can be summarized in a morphology map. Continuous production of fine ZnO particles has been also investigated by means of a tubular reactor.

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SINTERING AND PROPERTIES OF $Ba_3ZnTa_2O_9$ / Cu BASED MULTILAYER CERAMIC CAPACITORS

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The dielectric $Ba(Zn_{1/3}Ta_{2/3})O_3$ (BZT) is a perovskite type material which exhibits attractive dielectric properties namely, a low losses factor ($\tan(\delta) < 10^{-3}$), a relatively high permittivity (ε_r around 30) and a low temperature coefficient of the permittivity ($|TC_e| < 100$ ppm/°C) at high frequencies (from MHz to GHz). These properties allow to use this ceramic for fabricating type I multilayer chip capacitors. Moreover it has been recently established that BZT ceramic can be sintered at as low temperature as 1050°C owing to the use of the addition of B_2O_3+LiF combined with a slight non-stoechiometry. It can be mentioned that the usual sintering temperature of BZT is around 1500°C. This sintering temperature lowering has permitted to process copper based multilayer ceramic capacitors. Obviously, the use of copper as inner electrodes implies that the sintering process must be performed in a foaming atmosphere. The paper presents hence the manufacturing as well as the microstrucure and the dielectrics properties of copper based multilayer ceramics capacitors. It is shown that the process allows to manufacturing high performance and cheaper type I ceramics capacitors.