

Synthesis and characterization of Bi₂O₃ nanoparticles by solvothermal method

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Bismuth is an advanced functional material with potential applications such as photo catalytic decomposition material, functional electronic material, and optical material, burning rate catalyst, anti-radiative material and medical composite material. We have employed an improved and surfactant free approach for the synthesis of Bismuth oxide (Bi₂O₃) nanoparticles at very low temperature of 110⁰ C. This new approach is based on a reaction of bismuth powder and de-ionized (DI) water without the use of any additives or surfactants. The optical, photoelectrical and photoluminescence properties of bismuth oxide films prepared by thermal oxidation of bismuth thin films has been studied [1]. At present, various methods are introduced for the synthesis of the nanoscale Bi₂O₃ particles including sol-gel method [2]. Solvothermal synthesis of Bi₂O₃ nanoparticles has been achieved in order to control phase structure and morphology [3]. XRD and SEM have been employed to characterize the Bi₂O₃ nanoparticles. By the morphological investigations using SEM, it was observed that the grown Bi₂O₃ products are having dimensions in the range of 3nm to 25nm. The reported method besides being organics free is economical, fast and free of pollution, which will make it suitable for large scale production.

The formation of Bi₂O₃ nanoparticles from the reagents of bismuth and de-ionized water can be explained with the help of facile reaction as follows:



It is observed that the grown product (Bi₂O₃ nanoparticles) has different shapes like triangular, rectangular, spherical, etc.

Keywords: nanoparticles, morphological studies, structural studies

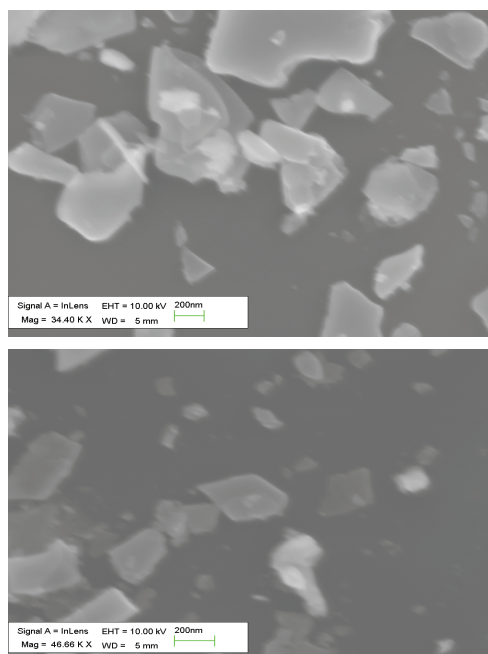


Figure 1: SEM image of Bi₂O₃ nanostructures

References

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