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SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF LEAD OXIDE

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ABSTRACT

The present paper reports the synthesis and structural characterization of lead oxide. The sample was prepared by Chemical route method using TEA as capping agent. The particle size of prepared sample was calculated by XRD technique and Confirmed by Scanning electron microscope. The average crystal size of the lead oxide was15-20nm range

Keywords: Lead oxide, XRD, SEM.

I. INTRODUCTION

Nanomaterials are those which can be defined as the size lies within the nanometric range i.e. from one to a hundred nanometers [1,2]. The nano materials can be obtained by special procedures of the materials. In this range nanomaterials behave differently against its normal forms considerably from molecules and atoms. The physical, chemical, electrical and optical properties of these materials and size and shape dependent and they often exhibit important differences in the bulk properties [3-4]. The materials at such scale have attracted many workers in various fields from material science to biotechnology and genetics. They are used in a variety of different areas, such as electronic, magneticand optoelectronic, biomedical, pharmaceutical, cosmetic, energy, environmental, catalytic, and materials applications[5-9].

Different techniques to synthesized nano range phosphor such as spray plasma-enhanced chemical vapor deposition [10], sol gel [11], sputtering [12]; pyrolysis [13], solid state reactions[14-19], co- precipitation [Bisen et al 2009] and combustion [20-23] etc have been used, but in recent times much interest has been generated around the chemical route technique. The technique is simple cost; effective, reproducible and the material are readily available [24-27].The technique is simple cost; effective, reproducible and the material are readily available

Lead oxides have many applications such as usage in dye, glass industry (lead glasses), piezoelectric ceramics, super capacitors and lead acid batteries specially as in nano particle. Nanometer-sized particles of metal coordination polymers are fascinating to explore, since their unique properties are controlled by the large number of surface molecules, which experience an entirely different environmentthan those in a bulk crystal. Several studies have been reported about the synthesis of PbO nanopowders [24-27], but if we look them carefully, morphology of finally products is very different from each other. On the other hand, the aim of this study is to demonstrate the optical and structure properties of the finally nano range lead oxide.

II. EXPERIMENTAL PROCEDURE

2.1. Powder Preparation*:* For making reaction solution 0.04M aqueous solution of lead nitrate is mixed with 0.08M aqueous solution of sodium hydroxide (all AR grade 99.9% pure). After, we have added 3 ml TEA in the solutions [14]. The reaction solution is allowed to stand for 20 to 24 hours. The powder is thoroughly washed out (more than 8 times) with distilled water. It is filtered and dried in sunlight. It is then annealed in hot air oven at 290^{o} C. The resultant effect is the colour of the powder appeared yellow [27,28].

III. RESULTS AND DISCUSSION

3.1 X- Ray Diffraction (XRD) Result: The XRD pattern of the sample is shown in figure 1. The XRD pattern recorded lead oxide. The width of the peak increases as the size of the particle decreases. The size of the particle has been computed from the full width half maximum (FWHM) of the intense peak using Scherer formula. Particle size of sample in the range 17 nm is found. Formula used for calculation is [29]

$$D = \frac{0.9\lambda}{\beta \cos\theta}$$

Here D is particle size, β is FWHM (full width half maximum), λ is the wavelength of X ray source and θ is angle of diffraction

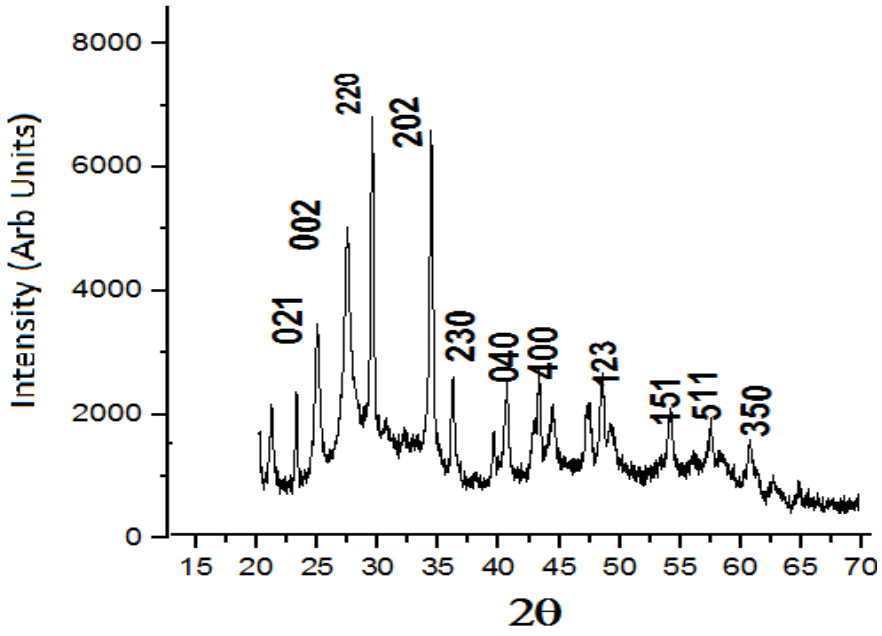

Fig 1 X-ray diffraction pattern of lead oxide

3.2 Scanning Electron Microscope (SEM)

For surface morphology and particle size analysis was cleared by SEM analysis (figure 2). Here the prepared sample shows good morphology and connectivity with grain.Here the particles are nano crystalline. Its is looks like rod type.

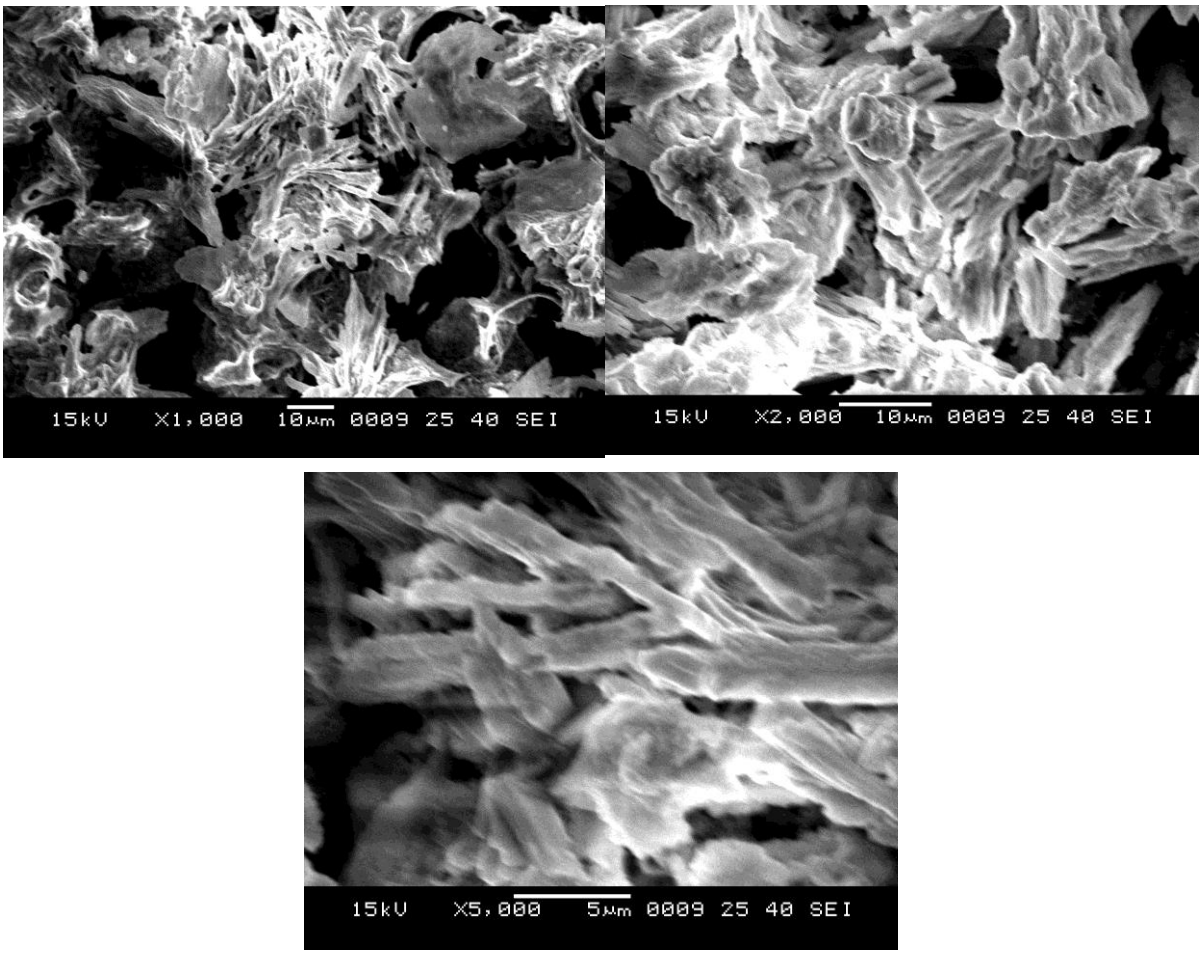

Figure 2. SEM image of lead oxide

IV. CONCLUSIONS

Lead oxide has been successfully prepared by co-precipitation method using lead nitrate and sodium hydroxide with TEA as complexing agent. The particle size was found 17-20 nn range. Plate and powder like morphology showed in SEM images. Particle size was obtained in nano range.

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