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Magnesium oxide nanoparticles- Synthesis and Charecterisation

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ABSTRACT

Magnesium oxide nanoparticles (MgONPs) have been synthesised by mixing aqueous solutions of magnesium sulphate and sodium hydroxide. The resulting precipitate of magnesium hydroxide was heated strongly to get dry precipitate. Then it was heated strongly at 300 C for hours. The resulted magnesium oxide nanoparticles were characterized by SEM and EDAX. The MgONPs appeared in the form of plates and clusters. The size was in the range of 128 to 187 nm.

Keywords: synthesis of magnesium oxide nanoparticles, plates and clusters, SEM and EDAX

Introduction

Discoveries in the past decade have shown that once materials are prepared in the form of very small particles, they change significantly their physical and chemical properties, sometimes to the extent that completely new phenomena are established[1,2].Magnesium oxide nanoparticles can be applied in electronics, catalysis, ceramics, petrochemical products, coatings and many other fields. Magnesium oxide nanoparticles can be used along with wood chips and shavings to make materials such as sound-proof, light-weight, heat-insulating and refractory fiber board and metallic ceramics.The potential applications of magnesium oxide nanoparticles are as follows:High-temperature dehydrating agent used for the production of silicon steel sheet, high-grade ceramic material, electronic industry material, adhesive and additive in the chemical raw material; Electric insulating material for making crucible, smelter, insulated conduit, electrode bar, and electrode sheet; High-frequency magnetic-rod antenna, magnetic device filler, insulating material filler and various carriers used in radio industry.Many researchers have discussed the synthesis and applications of magnesium oxide nanoparticles[3-8].MgONPs have been used for efficient adsorption[4] and environmental protection by adsorbing uraranium ions [3,5]. Devimesnakshi et al have used polyvinylpyrrolidone as capping agent while preparing MgONPs[8].Reactive magnesium oxide nanoparticles and halogen (Cl2, Br2) adducts of these MgO particles were allowed to contact certain bacteria and spore cells. Bacteriological test data, atomic force microscopy (AFM) images, and electron microscopy (TEM) images are provided, which yield insight into the biocidal action of these nanoscale materials[9].The present work is undertaken to synthesise MgONPs without using any capping agent, and characterize the MgONPs by SEM and EDAX.

EXPERIMENTAL METHOD

Synthesis of magnesium oxide nanoparticles

Synthesis of magnesium oxide nanoparticles is schematically shown in Scheme 1.

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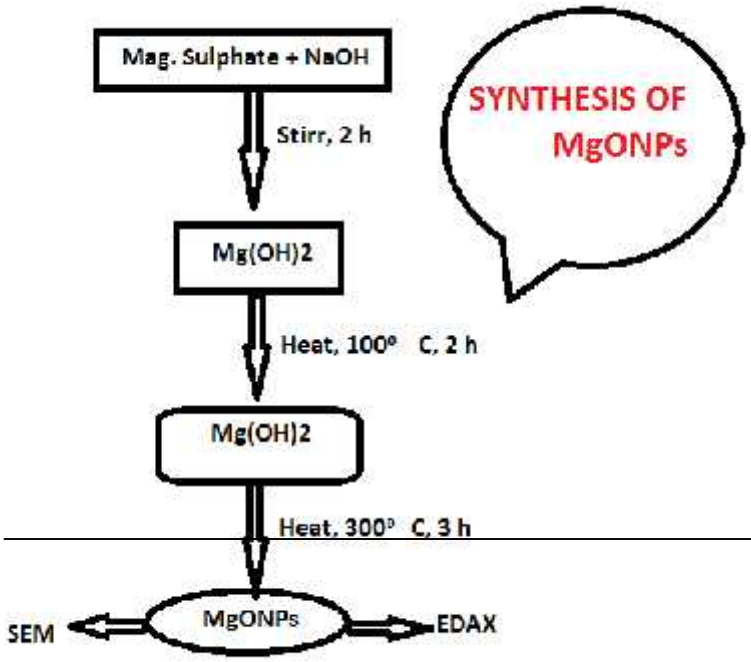

Scheme 1: Synthesis of magnesium oxide nanoparticles

Magnesium oxide nanoparticles were prepared by precipitation method.The precursor of magnesium oxide nanoparticles (MgONPs) , magnesium hydroxide was first prepared. Then it was heated at high temperature to get the MgONPs.

Preparation of the precursor

5g of magnesium sulphate ($MgSO_4$) was dissolved in 100ml of distilled water and 5g of sodium hydroxide (NaOH) pellet was dissolved in 100ml of distilled water.50ml of magnesium sulfate solution and 50ml of sodium hydroxide solution were mixed. The solution was stirred with a magnetic stirrer for 2h. Magnesium hydroxide was precipitated. The solution was heated at 100^oC for 2 hours in an hot air oven. The precursor , magnesium hydroxide was produced.

Preparation of MgONPs

The precursor was taken in a silica crucible and heated in a muffle furnace at 300^oC for 3 hours. MgONPs were produced. They were characterized by SEM and EDAX.

RESULTS AND DISCUSSION

Characterization of MgO nanoparticles by SEM and EDAX

The SEM image of MgONPs is shown in Fig 1. The quantitative results are shown in Fig 2 and the percentage of elements is given in Table 1. The EDAX spectrum is shown in Fig 3.

The MgONPs are present in the form of plates and clusters. The particle size is in the range of 120 to 187nm (Fig 4).

Table 1: Percentage of elements

Element	Weight %	Atomic %
O K	93.21	95.43
Mg K	6.79	4.57
Totals	100.00	

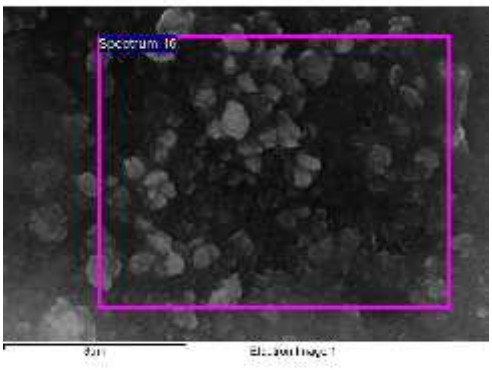

Fig1: The SEM image of MgONPs

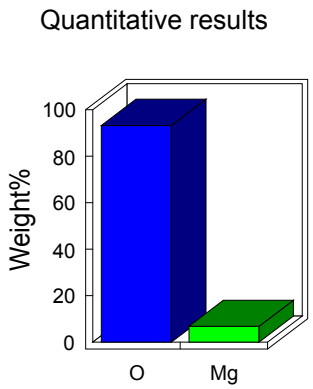

Fig 2: The quantitative results

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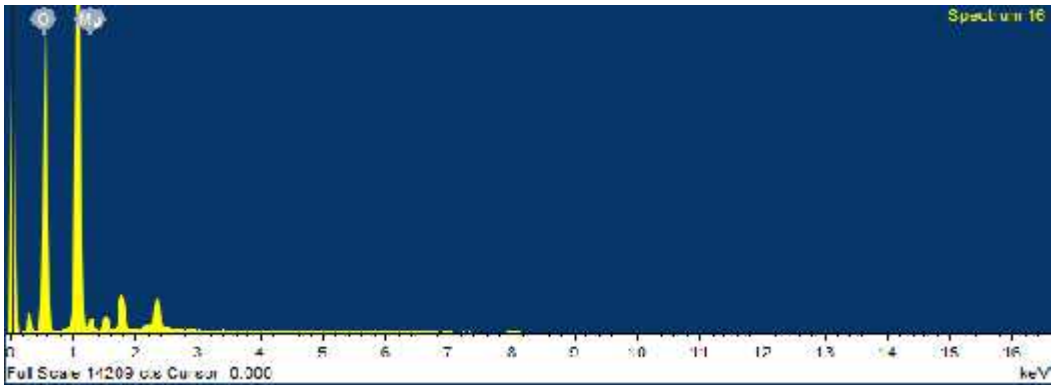

Fig 3: The EDAX spectrum of MgONPs

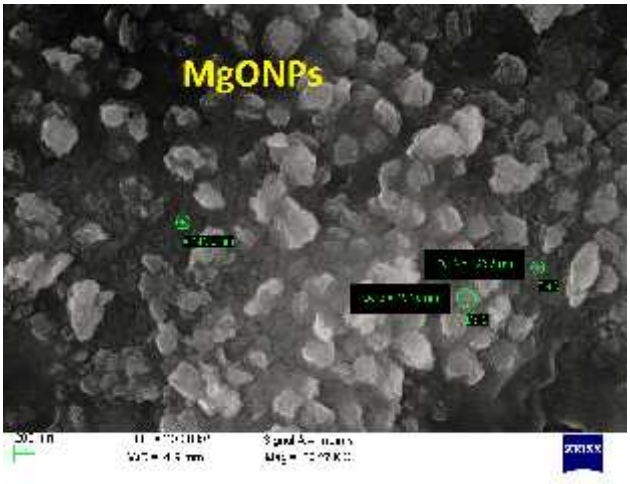

Fig 4: The size of MgONPs

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REFERENCES

[1] Klabunde, K. J. In Nanoscale materials in chemistry; 2001 and references therein.

[2] Schmid, G. Chem. Rev. 1992, 92, 1709-1727 and references therein.

[3] Jun-Kai Gao, Li-An Hou, Guang-Hui Zhang, Ping Gu, Facile functionalized of SBA-15 via a biomimetic coating and its application in efficient removal of uranium ions from aqueous solution, *Journal of Hazardous Materials*, 2015, **286**, 325

[4]Wancheng Zhu, Linlin Zhang, Gui-Li Tian, Ruguo Wang, Heng Zhang, Xianglan Piao, Qiang Zhang, Flux and surfactant directed facile thermal conversion synthesis of hierarchical porous MgO for efficient adsorption and catalytic growth of carbon nanotubes, *CrystEngComm*, 2014, **16**, 3, 308

[5]Amit Bhatnagar, Mika Sillanpää, Nanomaterials for Environmental Protection, 2014, 237

[6]K. R. Nemade, S. A. Waghuley, Synthesis of MgO Nanoparticles by Solvent Mixed Spray Pyrolysis Technique for Optical Investigation, *International Journal of Metals*, 2014, **2014**, 1

[7]S. Balamurugan, L. Ashna, P. Parthiban, Synthesis of Nanocrystalline MgO Particles by Combustion Followed by Annealing Method Using Hexamine as a Fuel, *Journal of Nanotechnology*, 2014, **2014**, 1

[8] S. Devi Meenakshi, M. Rajarajan, Susai Rajendran, Z. Robert Kennedy and G. Brindha, Synthesis and characterization of magnesium oxide nanoparticles, **Nanotechnology, *Elixir Nanotechnology 50 (2012) 10618-10620***

[9] Peter K. Stoimenov, Rosalyn L. Klinger, George L. Marchin, and Kenneth J. Klabunde, Metal Oxide Nanoparticles as Bactericidal Agents, Langmuir 2002, 18, 6679-6686.

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