

**SYNTHESIS AND CHARACTERIZATION OF MgO
NANOPOWDERS BY SOL-GEL METHOD INCORPORATED
REFLUX APPROACH**

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ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF MgO NANOPOWDERS BY SOL-GEL METHOD INCORPORATED REFLUX APPROACH

Magnesium oxide powders have been prepared by sol-gel method in reflux condition. The powders are synthesized using magnesium acetate tetrahydrate and oxalic acid as precursors with ethanol as a solvent. The concentration of the oxalic acid have been varied which are 0.5 M and 1.0 M. All the sol-gel products were annealed at 600 °C, 700 °C and 800 °C for 6 hours. The annealed products were systematically investigated by Thermogravimetric Analyzer (TGA), X-Ray Diffraction (XRD) and Scanning Electron Microscope (SEM). The effects of annealing temperature and the concentration of oxalic acid onto phases and morphologies of MgO were investigated throughout this study. Thermogravimetric analysis provided insight into the decomposition process of the magnesium acetate tetrahydrate. The XRD analysis indicates that all the products were of cubic lattice with increasing degree of crystallinity when increased the annealing temperatures. Besides that, the crystallite sizes of MgO were increased due to increasing of annealing temperatures and the concentration of oxalic acid. In this study, the crystallite size of the MgO products was in a range from 13.5 nm to 22.7 nm. The morphology of MgO was nanospheres.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

Magnesium oxide (MgO) is a versatile oxide material due to its unique physical and chemical properties. For example, this material is very stable thermally. In addition, MgO has high melting point (2850 °C) and high boiling point (3600 °C) (Klabunde, 2001). Thus, these factors cause MgO compounds become extremely important for use in industries and very useful for various applications. For instances, they are used in catalysis, toxic waste remediation, antibacterial materials, refractory material industries paints and superconductor products (Wang *et al.*, 2006).

Since the discovery of carbon nanotubes, compounds with such interesting morphologies and specific structures, are getting much attention by researchers due to their special properties. It is well known that the shape and size of the nanostructures have much on their properties (Yang *et al.*, 2005). Therefore, more researches have been focused on the synthesis and characterization of magnesium oxides with various sizes and morphologies. There are many novel nanostructures of MgO have been synthesized, including nanoparticles (Elaheh *et al.*, 2008), nanoplates (Meshkani *et al.*,