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FABRICATION OF MAGNESIUM HYDROXIDE NANONEEDLES

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Magnesium hydroxide $Mg(OH)_2$ nanoneedles with diameters of 40-60 nm and lengths of more than 650 nm have been fabricated by a fast and safe route in de-ionized water. X-ray diffraction (XRD) showed that the $Mg(OH)_2$ nanoneedles were well-crystallized with the hexagonal structure, whereas from the morphological investigations using scanning electron microscope (SEM), it was revealed that the nanoneedles are grown in a very high density over the whole foil substrate. The structure features were also analyzed by high~resolution transmission electron microscopy (TEM). The approach is based on a simple reaction of magnesium foil and de-ionized water without using surfactants. The reaction time is 3 h and the temperature is ~110°C. The advantages of producing nanoneedles using this method include ease, flexibility, speed, and cost. The process can easily be scaled up.

Keywords: *Dl-water; Mg foil; fast synthesis; nanoneedles; structural properties*

1. Introduction

The metal hydroxids are extremely important Magnesium hydroxide $Mg(OH)_2$ is a nontoxic, noncorrosive, thermally stable, and environmental friendly flame retardant that undergoes endothermic dehydration and suppresses fumes during fires. In the past there has been a growing interest in the use of magnesium hydroxide powders as flame retardant additives for manufacturing flame retardant thermoplastic [1, 2]. It is also f used as neutralizer in the treatment of acid waste water and gases rich in sulfuric oxides and as an antacid excipient in pharmaceuticals [3]. It has been found that magnesium hydroxide can be used as a starting material for controlling the synthesis of magnesium oxide.

The synthesis of magnesium hydroxide $Mg(OH)_2$ nanostructures with special morphologies has recently attracted much attraction because of novel applications in electronics, catalysis, ceramics, nanostructured composites and halogen-free flame retardants [4]. One-dimensional (1D) nanoscale materials have excellent electronic, optical, and mechanical properties for potential applications in nanodevices. Many attempts have been made to synthesize one-dimensional nanostructure materials using a variety of nanofabrication techniques and crystal growth methods such as vapor-liquid-solid [5], laser ablation [6], assistant-template [7], and other

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