UNIVERSITI TEKNOLOGI MARA

Influence of Mg in Electrical, Optical and Structural Properties in Mg-doped ZnO Thin Film Prepared by Sol-Gel Method

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ABSTRACT

This paper investigates the effect of Mg doped ZnO based on its structural, electrical and optical characteristic. ZnO were doped with MgAc with 0at%, 2at%, 4at%, 6at%, 8at%, 10at%. Spin coating method were used and samples were deposited on glass substrate. Structural characteristic of MgZnO appeared to possess the crystalline microstructures of nanometer order with uniform and dense distribution by using Field Emission Scanning Electron Microscopy(FESEM). Optical properties using Ultra Violet-Visible(UV-Vis) obtain result of spiking around 375nm wavelength, demonstrating high UV light absorption and transmittance due to incorporation of MgAc. Electrical properties were observed and obtain result of an ohmic with Platinum(Pt) metal contact for IV-characteristics and increase linearly in term of Hall Effect measurement.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Zinc oxide is a wide band gap semiconductor with direct band gap of 3.37 eV with a large excitation binding energy (60meV)[1][2][3]. The unique properties of ZnO in structural, optical and electrical properties brings a lot of attention among researchers[4].Besides that, ZnO also has been a promising material for practical applications of photonics and optoelectronics[5]–[7]. ZnO also have been studied for various type of application such as optoelectronic devices[8], solar cells[3], gas sensor[9], varistor and field effect transistor.

ZnO thin film can be prepared by various methods including chemical vapor deposition[10], sputtering[11], pulsed laser deposition[3], sol-gel[1][2][9], thermal evaporation[6], anodization[12] and electrospinning[13]. For this study, the most relevant method was sol-gel method which low in cost, simple process, enable control over the composition and dopant incorporation. [1][2][7].

ZnO have potential in certain electrical, structural and optical properties but required higher conductivity, better structural and optical properties[14], [15]. The scope of this study was to obtain crystalline microstructures, better optical properties and higher current capabilities. Besides that, optical bandgap of ZnO was wide enough to certain