EFFECT OF NANO-FILLER LOADING ON THE DIELECTRIC LAYER PROPERTIES

Thesis presented in partial fulfillment for the award of the

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ABSTRACT

This thesis reports on the effects of the nano-filler ranging from 0.0-3.0 wt% on the dielectric layer properties of magnesium oxide film by sol-gel spin coating technique. The dielectric layer properties are studied in terms of electrical, relative permittivity and it's morphology. The electrical and permittivity characteristic were characterized using 2-pointprobe *I-V* measurement and impedance spectroscopy while its morphology and topology is characterized using field emission scanning electron microscopy (FESEM) and Atomic force microscopy(Park system-XE 100) respectively. Relative permittivity of MgO films are decrease while the resistivity is increasing as the MgO nano-filler content is increasing. The best weight percentage of nano-filler is 1.0 wt%. The increases of the nano-filler content greater than 1.0 wt% resulted in high porosity.

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INTRODUCTION

1.0 INTRODUCTION

The high dielectric material is required for better application of capacitor. Therefore this thesis reports on the effects of the magnesium oxide (MgO) nano-filler ranging from 0.0-3.0 wt% on the dielectric layer properties of magnesium oxide film by sol-gel spin coating technique. The dielectric layer properties are studied in terms of electrical, relative permittivity and its surface characteristic. The electrical and permittivity characteristic were characterized using 2-pointprobe *I-V* measurement and impedance spectroscopy while its morphology and topology were characterized using field emission scanning electron microscopy (FESEM) and Atomic force microscopy(Park system-XE 100) respectively. Relative permittivity of MgO films were decreased while the resistivity were increased as the magnesium oxide (MgO) nano-filler was increased. The best weight percentage of nano-filler was 1.0 wt%. Increased of the nano-filler content greater than 1.0 wt% resulted in high porosity.

1.1 BACKGROUND STUDY

Capacitor is a device that used to store the electrical charge. It consists of two parallel metallic plate that separated by an insulating layer. An equal and opposite charge forms on the other side of electrode when a direct current (DC) voltage is applied to one side of capacitor. In most case, the DC voltage is applied to the metal side of the capacitor and the charge is formed in the semiconductor. The value of capacitance that capacitor can