STRUCTURE AND DIELECTRIC PROPERTIES OF BISMUTH FERRITE BY ADDING CALCIUM COPPER TITANATE

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TABLE OF CONTENT

CHAPTER 1 : INTRODUCTION

CHAPTER 2 : LITERATURE REVIEW

2.1 Introduction

2.2 Structure

2.3 Dielectric Properties

ABSTRACT

Bismuth Ferrite, BiFeO3 (BFO) has stimulated a great interest in recent years for its room temperature multiferroic behavior with very high remnant polarization. However, the leakage current of BFO is very high. To reduce the leakage current, we have prepared by the conventional solid-state reaction method. X-ray powder diffraction analysis confirmed the formation phase structure of this composites. A new phase (BFO-CCTO) can be observed in the doped samples from the x-ray diffraction patterns. Dielectric properties of pure and doped BFO were investigated in a room temperature of 30°C or 303K. The results showed that by adding Calcium Copper Titanate into the Bismuth Ferrite could increase the dielectric properties of Bismuth Ferrite.

CHAPTER 1

INTRODUCTION

1.1 Background

Bismuth Ferrite is an inorganic chemical compound. $BiFeO_3$ is perhaps the only material that is both magnetic and s strong ferroelectric at room temperature (Catalan, 2009). BiFeO3 has received great attention due to its high ferroelectricity with high Curie temperature (T_c = 820°C - 850 °C) and the antifeeromagnetic properties below Neel temperature (T_N =350 °C - 380 °C). (Manoj Kumar, 2007).

$BiFeO_3$ shows a distorted perovskite structure with rhombohedral symmetry (space group R3C). The perovskite type unit cell has a lattice parameter of 3.965 Å and a rhombohedral angle of ca. 89.3-89.4 ° at room temperature. A very important structural parameter is the rotation angle of the oxygen octahedral. This angle would be 0 ° for a cubic perovskite with perfectly matched ionic sizes. The Fe-O-Fe angle is important because it controls both the magnetic exchange and orbital overlap between Fe and O, and as such it