Chapter-8

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Properties and Application of Perovskite Materials

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Abstract

The perovskite materials are synthesized through a high-temperature solid-state reaction method, Sol-gel method, Ball milling method. The design and the structure of the perovskite materials are confirmed by the x-ray diffraction technique. The dielectric properties of the materials are studied by using an LCR meter. The perovskite materials have an application due to the dielectric properties, optical properties, and magnetic properties are multilayer capacitor, dielectric resonator, thin-film resistor, electro strictive actuators, electro-optic modulator, magnetic bubble memory, etc.

Keywords: Solid-state reaction; Rietveld refinement; Impedance; AC conductivity;

8.1 Introduction

In recent decades materials, scientists are showing much more interest in the development of new multifunctional ceramic, polymer, polymeric composite for various applications in the fields of electronics and optoelectronics. Keeping an eye on the above demands, polymeric crystals, especially ferroelectric polymer-ceramic composites has gained huge attention due to their significant role in devices like thin-film capacitors, electronic transducers, pyroelectric sensors, and nonlinear optics, etc.[1]. A composite is a combination of two or more peculiar materials of various phases having different properties that produce the desired material which may not be achieved in single-phase materials[2]. Ferroelectric polymer ceramics have been in demand because of their significant properties which make them ideal for the photovoltaic process which is the core concept of the energy storage devices [3].

The electrical energy density can be expressed by the formula $U = (\varepsilon_r E_b 2)/2$,