OPTICAL PROPERTIES OF MAGNESIUM DOPED TIN OXIDE SYNTHESIZED BY MECHANOCHEMICAL PROCESSING

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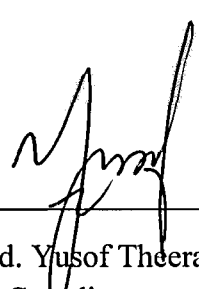

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ABSTRACT

OPTICAL PROPERTIES OF MAGNESIUM DOPED TIN OXIDE SYNTHESIZED BY MECHANOCHEMICAL PROCESSING

Mg doped nano-SnO is synthesized via ball milling technique for 5 hours. The Mg concentration is varied when doped with SnO. Each concentration goes through heat treatment and direct leaching process at same time. The characterized of samples using XRD, UV-Vis and PL. XRD tracks the progress of nano-SnO formation during milling. The band gap determined using Uv-Vis Spectroscopy shows that as dopant concentration are high, the band gap decreases because of the dopants that filled the gap between conductance and valence band. Also, PL shows the intensity behavior of dopant concentration. Intensity is dependent with crystalline size of nanoparticles.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statements

Nanomaterials is a field that takes a materials science-based approach to nanotechnology. It studies materials with morphological features on the nanoscale, and especially those that have special properties stemming from their nanoscale dimensions. Nanoscales are composed of materials with sizes normally below 200nm in at least one dimension. These nano sized materials display different and exciting physical, chemical and mechanical properties compared to the bulk sized material. These unique properties of nanomaterials enthused scientists and technologists worldwide and it has been proven that by manipulating materials at nano levels, many applications, that are functionally and economically efficient to bulk, can be developed. (Tsuzuki and McCormick, 2000)

These nanomaterials exhibit such properties because of two reasons viz., high surface area to volume ratio and modified electronic structure due to dimensional confinement of electrons. Atoms in the first few atomic layers below the surface of any solid material are completely different from that of interior atoms in terms of structure, lattice parameters, electronic structure, physical properties and reactivity. This could be attributed to the relaxation and rearrangement of atoms in the layers below the surface. In bulk materials the amount of material that undergoes this kind of modification doesn't influence the bulk properties as surface area of bulk materials is very less. But interestingly, surface area of nano materials increases exponentially with decreasing particle size below 100nm and thus, the material that's got modified