

Thesis Title	A Study of Optical and Electrical Properties of Zinc Oxide Thin Film ( By Sputtering Process )
Thesis Credits	15
Candidate	Mr.Anucha Watanapa
Supervisors	Asst.Prof.Dr.Supathanapong Dumrongrathana Dr.Nandh Thavarungkul
Degree of Study	Master of Engineering
Department	Materials Technology
Academic Years	2001

#### Abstract

This research is to study the optical and electrical properties of zinc oxide thin film. This Zinc Oxide thin film was produced by D.C. Sputtering technique in which the electrical power and time were controlled and varied. The produced specimens were taken to analyze thicknesses, deposition rates, microstructures , optical and electrical properties.

In the experiments, the zinc oxide thin films were sputtered over the corning glass 2948 from 99.91 wt% pure zinc target at room temperature. Then, the films were annealed in quartz tube furnace at 300°C in oxygen controlled atmosphere. The optical measurements were conducted using Shimatsu UV-2100 Photo spectrometer for reflection,transmission and absorption from 190 nm to 2100 nm wavelength. The crystalstructure of films were evaluated using Phillips 1730/10 X-ray diffractometer. The surface morphology of film was examined by JEOL JSM-6301F scanning electron microscope.

Results from the experiments show that zinc oxide film has light yellow transparent color, which yields the average range of transmitted visible light more than 88 percent and yields the average range of transmitted infared light more than 92 percent. The optical measurement graphs show an abrupt change at two wavelengths, which are 950 and 375 nanometers. This result indicates that the frequency of zinc plasma wavelength is at 950 and zinc oxide absorption edge is at 375 nm due to energy gap of ZnO at 3.31 ev and the Heat Mirror Index(HMI) of thin films are lower than 1

due to the lower value of transmitted visible spectrum compare to that of infared spectrum. The process of producing ZnO film by sputtering Zn film and oxidation at high temperature is not a suitable process for heat mirror production

Keywords : d.c.Sputtering / zinc oxide film / electrical property / optical property / heat mirror