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SURFACE ANALYSIS OF THIN FILMS USING INTERFEROMETRIC TECHNIQUE

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DEPARTMENT OF PHYSICS

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ABSTRACT

The use of CCD cameras, computers, and softwares in interferometry has enhanced tremendous improvement in the inspection of the optoelectronic devices being manufactured. Thin films are fabricated through various techniques on a substrate. Research on characterization techniques of thin films such as x-ray diffraction, scanning electron microscopy and energy-dispersive x-rays have being done. However, little research has been carried out in analyzing the surface profile and thickness of thin films by interferometric technique. To measure these parameters, thin films having different thickness of zinc selenide (ZnSe) and lead selenide (pbSe) will be deposited by evaporation technique onto a pre-cleaned glass slide. The interferometric technique involves the use of optical system where He-Ne laser light is filtered and then splitted into two beams that take different directions. The two beams re-unite again after travelling different directions, where one of the beams passes through the thin film resulting to an interference pattern. The resulting interference pattern is determined by the phase difference between the two waves. If the waves are in phase, constructive interference occurs while destructive interference occurs if they are out of phase. The interference patterns will be recorded by the CCD camera and stored in the computer for analysis. The surface profile will be determined by subtracting the fringe patterns of the substrate from the fringe patterns of the thin films. The thickness of the films will be determined by using the fringe width of the film and the shift between the interference fringes of the substrate and the film. A software will be used to analyze the interferograms of the thin films for the surface profiles.

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ABBREVIATIONS

BS: Beam splitter

CCD: Charged coupled device

He-Ne: helium neon

Ksh: Kenya shilling

M: Mirror

MZI: Mach-zehnder interferometry

pbSe: Lead selenide

ZnSe: Zinc selenide