

101-2 Preliminary Syllabus, Da-Yeh Univ

Information			
Title	光電材料與元件技術	Serial No. / ID	2214 / EEI4044
Dept.	電機工程學系	School System / Class	大學日間部3年1班
Lecturer	張永平	Full or Part-time	兼任
Required / Credit	Optinal / 3	Graduate Class	No
Time / Place	(四)234 / H340	Language	Chinese

Introduction

This course provides fundamental knowledge about photovoltaic materials and devices. Students will acquire analytical and numerical skills to analyze the quality of different photovoltaic materials and evaluate the performance of photovoltaic devices. Students will also learn to design solar cells for a given material system and technology and suggest ways to improve the efficiency of solar cells. They will also be taught about different solar cell structures and fabrication technologies, including the first, second, and third generation PV technologies. Assignments will provide an opportunity for students to think critically about the course material and challenge their knowledge. Some assignments will involve device simulations using AMPS simulator. Furthermore, students will practice literature survey on major PV topics including carrier transport in PV materials and junctions and characterization of PV materials and devices.

Outline

1. Electronic properties of semiconductor materials for optoelectronic devices:
To develop firm understanding of the theory and fundamental electrical characteristics of semiconductor materials relevant to optoelectronic devices.
2. Optical properties of selected semiconductor materials:
To develop sound understanding of basic optical characteristics of some semiconductor materials.
3. P-N junction ? the basic structure for optoelectronic device realization:
To gain sound understanding of the principles of operation of various junctions, including Schottky contacts and heterojunctions and their importance to optoelectronic device fabrication.
4. Light Emitting Diodes (LEDs):
To develop good understanding of the principles of operation of LEDs, their structures and applications.
5. Semiconductor Laser Diodes
To understand the principles of operation of semiconductor laser diodes and the role they play in modern fiber optic communication systems.
6. Photodetectors.
To understand the operation of different types of photodetectors: PIN, APD, Photoconductive, Bolometer.

7. Optoelectronic modulators. To understand the principles of the electro-optic effect, materials that exhibit the E-O effect and how they can be fabricated into practical intensity or phase modulators.

Prerequisite

Fundamentals of Optics, Electricity and Magnetism, Semiconductor Physics.