PERIYAR UNIVERSITY
(NAAC 'A' Grade- State University- NIRF Rank 68)
SALEM – 636 011
DEPARTMENT OF PHYSICS

February 2020

Value Added course: Fabrication of Solar Cell (PGPHYVA07)
Course mentor: Dr. T. Pazhanivel & Dr. R. Ramesh

Introduction:

This course is offered by the department of Physics as on open course, for all the science students who want to acquire knowledge about various types and fabrication process in field of Solar cell. This course provides fundamental concepts to the state-of-the-art in the respective area of solar cell. Solar energy is a major renewable energy source with the potential to meet many of the challenges facing the world. There are many reasons to promote its share in the energy market. This power source is increasing in popularity because it is versatile with many benefits to people and the environment. So, all the students must aware know the uses of solar energy and its conversion process.

Course outcome:

CO1 : Acquire a basic knowledge on various parameters of solar cell concept.
CO2 : Understand the principles of Solar cell and design.
CO3 : Gain the knowledge on different type of solar cell.
CO4 : Develops an ability to analyse and design energy conversion system.

Syllabus:

Basic Phenomena in Solar cell: Electrons and holes in semiconductors, doping, electrical transport, Photo carrier generation and recombination, Depletion region, depletion capacitance, Carrier and current densities, Current voltage characteristics in dark and light

Principle of cell design: Cell type, Optical design, surface and bulk recombination losess, design and fabrication of metal contacts, Crystalline Silicon and III-V Solar cells: Single, tandem and multi-junction solar cells

Thin Film Solar cells: Amorphous silicon, cadmium telluride and copper indium gallium di-selenide based solar cells; Organic photovoltaic Devices.

Course Duration : 36 Hours

PERIYAR UNIVERSITY
(NAAC 'A' Grade- State University- NIRF Rank 68)
SALEM – 636 011
DEPARTMENT OF PHYSICS

February 2020

Value Added course: Crystal Growth (PGPHYVA04)
Course mentor: Dr. E.K.Girija & Dr. J. Kalyana Sundar

Introduction:

This course is offered by the Department of Physics as on open course, for all the science students who want to acquire knowledge about Crystal Growth. Crystals are the pillars of modern technological developments in various fields involving optical, electrical, magnetic *etc* applications. For the past several decades there has been lot of interest in growing good quality single crystals for various technological applications.

Course outcome:
CO1 : Acquire a fundamental knowledge on crystal growth
CO2 : Understand the principles of crystal growth from solution
CO3 : Learn the different methods of low temperature solution growth
CO4 : Learn the methods of crystal growth from high temperature solution

Syllabus:

Fundamentals of Crystal Growth:

Introduction to crystal growth - Classification of crystal growth methods –Nucleation: Kinds of nucleation – Classical theory of nucleation: Gibbs Thomson equations for vapour and solution – Kinetic theory of nucleation – Energy of formation of a spherical nucleus – Statistical theory on nucleation: Equilibrium concentration of critical nuclei, Free energy of formation.

Crystal growth from solution:

Growth from low temperature solutions - Selection of solvents and solubility – Meir's solubility diagram – Saturation and supersaturation – Metastable zone width – Growth by restricted evaporation of solvent, slow cooling of solution and slow evaporation.

Growth from high temperature solutions:

Flux growth - Principles of flux method – Choice of flux – Growth by constant temperature and slow cooling methods - temperature gradient methods – Hydrothermal growth method.

.

Course Duration : 36 Hours