INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td>Course Title</td><td>Materials Fabrication and Characterization Techniques</td><td>Course No
(to be assigned by Academic Cell)</td><td colspan="4">PHY5XXX</td></tr>
<tr><td>Specialization</td><td>Materials Science</td><td>Structure (LTPC)</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>To be offered for</td><td>UG / PG / Ph.D.</td><td>Status</td><td colspan="2">Core ☐</td><td colspan="2">Elective ▬</td></tr>
<tr><td>Faculty Proposing the course</td><td>Dr. Y. Ashok Kumar Reddy</td><td>Type</td><td colspan="2">New ▬</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Date of DAC</td><td>05/09/2018</td><td>Members Present</td><td colspan="4">All Faculty Members of the Dept.</td></tr>
<tr><td>Pre-requisite</td><td>None</td><td>Submitted for approval</td><td colspan="4">38th Senate</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">• To know the deposition techniques for the manufacture of products
• To study the physical, morphological and chemical properties</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">• This course aims to learn the different techniques to fabricate the device samples
• It can be mainly useful for PG, DD and as well as PhD students towards making the products and study the basic properties of the synthesized samples</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">I. Preparation of Thin Films
A. Vacuum basics: (5)
Production of Vacuum, Pressure measurement Gauges in Vacuum system
B. Physical methods: (10)
Thermal evaporation, Electron beam evaporation, Pulsed laser deposition and Molecular beam epitaxy.
Sputtering: DC and RF sputtering, Glow discharge and Reactive magnetron sputtering.
C: Chemical methods: (5)
Atomic layer deposition, Chemical vapour deposition, Spray pyrolysis and Spin-coating.
II. properties and Applications of Thin Films
A. Characterization of thin films: (15)
Crystallography Technique: X-Ray Diffraction.
Imaging Techniques: Scanning electron microscopy, Transmission electron microscopy, Atomic force microscopy and Rutherford Backscattering Spectrometry.
Spectroscopic Techniques: Energy Dispersive Spectroscopy, X-ray Photo electron Spectroscopy, Raman Spectroscopy, Secondary Ion Mass Spectrometry, Auger Electron Spectroscopy, UV-Vis-NIR Spectroscopy and Fourier Transform Infrared Spectroscopy.
B. Applications of Thin Films: (7)
Photolithography: Photoresists, Mask and pattern generation;
Thin film capacitors, diodes and photodetectors;
Thin film solar cells, Thin film micro-batteries;
Thin film sensors: Gas sensors, Bolometers.</td></tr>
<tr><td>Text Books</td><td colspan="6">1. Handbook of Thin Film Technology, Hartmut Frey, H.R. Khan, Springer, 1st ed. 2015.
2. Materials Science of Thin Films: Deposition and Structure, Milton Ohring , D. Gall, S. P. Baker, Academic Press Inc, 3rd ed. 2014.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. Handbook of Thin Film Deposition, K. Seshan, D. Schepis, William Andrew, 4th ed. 2018.
2. Surface Analysis Methods in Materials Science, J. O'Connor, B. Sexton, R.S.C. Smart, Springer-Verlag Berlin Heidelberg, 2nd ed. 2003.
3. Materials Science of Thin Films: Deposition and Structure, Milton Ohring , D. Gall, S.P. Baker, Academic Press Inc, 3rd ed. 2014.</td></tr>
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