POLYMER BLENDS AND ALLOYS

Course Objective:
To introduce the basic concepts on IPN's, blends, compatibilization of blends and characterization techniques. To familiarize different types of blends based on their morphology. To give the concept of improvement of material properties by blending. Understanding the concept of blending and also the preparation of polymer gels and polymer electrolytes as it is important to develop various products for different applications.
Syllabus

Module I: (10 Hours)
Introduction to Polymer Blends & Its Phase Behaviour
Definition of polymer blends and alloys - Classification - Criteria for selection of polymer – Thermodynamics of miscibility – Phase morphology – Phase separation behaviour - Determination of morphology of polymer blend – Mechanical compatibility - Electron Microscopy.

Module II: (10 Hours)
Blend Preparation Techniques
Principles and methods involved in preparation of Polymer blends and alloys - Introduction to polymer rheology in blend – Interpenetrating polymer network: Synthesis, Morphology, Properties and application of polymer blend - Enhancement of polymer miscibility – utilization of miscible polymers.

Module III: (12 Hours)
Types of Polymer Blends & Bonding
Liquid Crystalline Polymer, Blends-Ternary Polymer – Elastomer, Blends-Polymer blends containing block copolymers-– Biodegradable polymer blends- Recycled polymer blends, toughened polymers- Specific examples for toughened thermoplastics and thermosets – specific interaction - hydrogen bonding interaction, dipole-dipole interaction, ion–dipole & ion-ion interaction and additional specific interaction

Module IV: (06 Hours)
Applications of Polymer Blends
Application of Blends in Emerging technology - Photovoltaic, Light Emitting Diode, Electro chromic, Electric conductivity polymer and blends, Lithium battery & Fuel cells Applications

Course outcomes: After the completion of this course, students will be able to:
CO1 Understand the concept of blends, and IPN's
CO2 Evaluate characteristics of blends and alloys
CO3 Understand the concept of improving material properties by blending
CO4 Understand different blending techniques, concept of solubility and different theories associated and phase behavior of polymer blends
CO5 Remember and understand compatibilization of polymer blends followed by different characterization techniques used for polymer blends.

Books:

1. Lloyd M. Robeson - Polymer Blends: A Comprehensive Review, Hanser Publishers, 2007
2. Utracki, "Polymer Blends and Alloys", Hanser Publisher
3. D R Paul and S Newman, "Polymer Blends Vol. I & II", Academic Press Inc, 1978
4. Olabisis, I W Rubison and M T Shaw Polymer - Polymer Miscibility Academic Press - New York 1979