SS849 PHOTOCATALYSIS: MATERIALS, METHODS AND APPLICATIONS 3-1-0-4

Unit 1: Introduction: Introduction to photocatalysis and fundamentals of semiconducting materials

Unit 2: Characterization of photocatalytic materials:

Physicochemical characterization - Diffuse reflectance spectroscopy, Photoluminescence spectroscopy, Raman spectroscopy including the revision of general materials characterization techniques such as XRD, FT-IR, SEM and TEM

Electrochemical characterization – Flat band potential, Photocurrent measurements,Schottky-Mott model, Electro Chemical Impedance (EIS)

Unit 3: Mechanism of Photocatalysis: Advanced oxidation process, Reactive oxygen species (ROS), Identification of ROS, Photo-Fenton process, TiO_2 as photocatalyst, band engineering and surface modifications to TiO_2, alternativecatalysts to TiO_2 and visible light photocatalysts (any 3-4 examples)

Unit 4: Applications of Photocatalysis: Removal of organic/inorganic, microbial pollutants, disinfection, mechanism and its models;self-cleaning materials, basics of photocatalyticreactor design and immobilization of photocatalyst

Unit 5: Photocatalytic water splitting: Fundamentals of water splitting, water oxidation and water reduction reactions and design of the catalyst for the photocatalytic water splitting

TEXT BOOKS/ REFERENCES:

1. Khan MM, Pradhan D, Sohn Y, editors. Nanocomposites for Visible Light-induced Photocatalysis. Springer; 2017
2. Hernández-Ramírez A, Medina-Ramírez I. Photocatalytic semiconductors. Springer, 2016
3. Kisch H. Semiconductor photocatalysis: principles and applications. John Wiley & Sons; 2014
4. Lu M. Photocatalysis and water purification: from fundamentals to recent applications. John Wiley & Sons; 2013
5. An T, Zhao H, Wong PK, editors. Advances in Photocatalytic Disinfection. Springer 2017.
6. Martin DJ. Investigation into high efficiency visible light photocatalysts for water reduction and oxidation. Springer; 2015