

## **CH 703: CRYSTAL ENGINEERING: MOLECULAR CRYSTAL FORMS AND THEIR APPLICATIONS (3-0-0: 3)**

### **Introduction**

Historical background of crystal engineering, intermolecular interactions, crystalline vs amorphous substances, different crystal forms for a same substance, crystal polymorphism, hydrates, solvates, molecular salts, cocrystals and their polymorphs, crystallization techniques.

### **Crystal polymorphism**

Identification, characterization, enantiotropic and monotropic polymorphs, thermodynamic and kinetic stability of polymorphs, IP issues and patentability, case studies.

### **Multicomponent molecular crystals**

Preparation and characterization of multicomponent molecular crystals, the salt-cocrystal continuum, the formation of solvates and hydrates via crystallization, solvent removal and inter-conversion, The impact of crystal forms in the pharmaceuticals, pigments etc. IP issues and patentability, case studies.

### **Metal organic frameworks (MOF)**

Historical back-ground of MOF, the relationship between coordination chemistry and coordination networks: spacers and knots, gas storage, catalysis, molecular sieves, adsorption and des-adsorption of molecules in/from MOF, case studies.

### **References**

1. G. R. Desiraju, J. J. Vittal and A. Ramanan, "Crystal Engineering: A Textbook" World Scientific.
2. G. R. Desiraju, "Supramolecular Synthons in Crystal Engineering—A New Organic Synthesis", Angewandte Chemie International Edition, Wiley.