



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Self-assemblies of Salts and Metal Complexes of 1,8-Naphthalimide Derivatives in Self-recognition and Cation Sensing

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**SHORT ABSTRACT**

The thesis dealt with the supramolecular chemistry of several naphthalimide derivatives and metal complexes, emphasizing the study of their structures to correlate properties. Accordingly, to the set goal to study supramolecular aspects, polymorphs, metal complexes, and salts of naphthalimides were prepared and characterized. Distinct physical properties of the polymorphs were demonstrated. The modulation of the amounts of naphthalimide in salts and metal complexes through self-recognition was demonstrated. Using a carboxylate ligand together with naphthalimide provided binuclear and trinuclear copper dicarboxylate complexes with different binding modes of both sets of ligands. A cadmium complex with aminonap as coordinated ligands, as well as a guest, displayed self-inclusion property. Electrochemical behavior of the copper complexes showed that the metal coordination could lower the electrochemical reduction potential, influence radical anion formation from the ligand, and stability. Utilizing pyridine-containing naphthalimide, ligands, copper, and cobalt complexes were prepared. Cobalt complex exhibited a stable hexacoordinate distorted octahedral structure, whereas copper complex displayed a five-coordinated, square pyramidal geometry, stabilized by supramolecular interactions. Formation of these complexes enabled to cause fluorescence enhancement of the parent naphthalimide through in-situ release of acid to protonate the free ligand, showing their potential in applications of sensing. A bi-component platform capable of distinguishing  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  ions with the help of UV-visible spectroscopy was developed. A zinc coordination polymer was prepared, and its utility for fluorescence-based metal ion sensing, showing selectivity for cadmium ions, was presented.