



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title:

Design and Development of Some Naphthalimide Luminogens: Studying Supramolecular Interactions, Photophysical Properties and Applications

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This thesis, titled "Design and Development of Naphthalimide Luminogens: Investigating Supramolecular Interactions, Photophysical Properties, and Applications," systematically explores the interplay between molecular design, supramolecular interactions, and photophysical properties in novel naphthalimide-based luminogens. The research begins with an overview of supramolecular chemistry, emphasizing the role of weak intermolecular forces in tuning the properties of organic luminogens. In Chapter 2, the development of NMICY, a naphthalimide luminogen with a unique J\*-aggregation pattern, demonstrates how molecular conformation can direct aggregation-induced emission (AIE) properties, enabling the selective detection of melamine in milk. Chapter 3 expands on this by exploring the impact of alkyl chain length and halogen substitution on room temperature phosphorescence (RTP), revealing that both molecular interactions and aggregation patterns are crucial for tuning RTP. Building on these insights, Chapter 4 introduces a series of naphthalimide luminogens with varied substituents, showing how functional group modifications can fine-tune aggregation behavior and photophysical properties, with applications in viral protein detection. Finally, Chapter 5 investigates the polymorphism and mechanoluminescence of naphthalimide compounds, highlighting the significance of crystal structure in controlling emission properties. Together, these chapters provide a cohesive narrative on the design and application of naphthalimide luminogens, offering new strategies for developing functional materials with tailored optical properties.