



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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**SHORT ABSTRACT**

This thesis encompasses the importance, synthesis and various molecular properties of the compound “*peri*-naphthoindigo (PNI)”. The effect of derivatization on its molecular properties along with its aggregation behavior in single as well as mixed component systems were also subjects of interest in this work.

To emphasize the possibility and probability of *peri*-naphthoindigo, chapter 1 revolves around the historical perspective of indigo and indigoid chemistry. This chapter also includes the structural modifications in the parent compound and how we arrived at the decision of synthesizing PNI. Chapter 2 elaborates all the synthetic attempts that went towards PNI. Although the classical methods of indigo synthesis failed to produce PNI, a one pot reaction involving Boron-mediated reductive cyclization, dimerization and oxidation was devised for PNI from 8-nitro-1-acetylnaphthalene. The compound was identified to be stable in its mono-enol form using various spectroscopic techniques. A detailed study of the photophysical, aggregation, electrochemical and halochromic behavior of PNI comprises chapter 3. The effects of changing the electronic environment around the central chromophore were very evident in these properties while compared to indigo. Once the process of aggregation was established, in chapter 4 further complication was introduced in terms of mixed molecular systems. Presence of social self-sorting in the self-assembly process of PNI and 1,8-naphthalimide derivatives was studied in this chapter. Attempts towards structural diversification of PNI using substitution at the chromophore, ring and metal complexation are discussed in Chapter 5. These structural changes lead towards change in solubility as well as the photophysical behaviors of the parent dye. Chapter 6, is a concluding note and briefs about the future prospective of the compound. Finally, all the experimental details are described in Chapter 7.