



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : **Ph.D.**

Thesis Title: **“Rational Engineering of Polyfluorene based Conjugated Polymers for Sensing and Antibacterial Applications”**

Name of Thesis Supervisor(s) : **Prof. Prameswar K. Iyer**

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**SHORT ABSTRACT**

The content of this report entitled **“Rational Engineering of Polyfluorene based Conjugated Polymers for Sensing and Antibacterial Applications”** is divided into five chapters.

The Chapter 1 provides elaborate introduction about the thesis research topics and includes the scope and significance of the subsequent chapters.

In the Chapter 2 the development of benzimidazole functionalized polyfluorene homopolymer (PFBZ) and its specific detection of bilirubin (jaundice biomarker) in the real serum samples as well as the preparation of fluorescence paper-based test kits for onsite bilirubin detection is presented.

The Chapter 3 discussed the synthesis of polyfluorene based copolymers PFP and PF2CN with the monomer M2CN playing a key role in tuning the emission wavelength as well as AIEE activity. Further, these polymers were utilized for the detection of pendimethalin (mutagenic and carcinogenic herbicide) in real vegetables and natural water samples and also a smartphone integrated point of care testing device was developed for rapid onsite detection in a very straightforward manner.

In the Chapter 4 the development of a series of copolymers P1, P2 and P3 by incorporation of M4 monomer and their structure property relationship in the molecular and aggregated level is presented. Further the AIEE active P3 polymer is functionalized with methyl imidazole to act as a receptor for HSA/BSA (predominant protein in human and animals' sera) in the aqueous medium. The PFAN detection of HSA/BSA shows significant color change which is beneficial for the construction of smartphone integrated point of care testing device for rapid onsite detection.

The Chapter 5 discussed the development of conjugated polyelectrolytes PFTMI and PFTPyMI and their antibacterial application.