INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	**AKHTAR HUSSAIN MALIK**
Roll Number	:	**126122024**
Programme of Study	:	**Ph.D.**

Thesis Title: **Design and Development of Polyfluorene Based Conjugated Polyelectrolytes for Sensing Applications**

Name of Thesis Supervisor(s)	:	**Prof. Parameswar Krishnan Iyer**
Thesis Submitted to the Department/ Center	:	**Chemistry**
Date of completion of Thesis Viva-Voce Exam	:	**24-11-2017**
Key words for description of Thesis Work	:	**Conjugated polymers, Fluorescence, Sensors, Forensic, Cancer**

SHORT ABSTRACT

The aim of the thesis was to design and develop conjugated polyelectrolyte (CPE) based fluorescence sensors for the sensitive and selective detection of various target analytes including explosive materials, environmental contaminants, fingerprint residues, cancer biomarkers etc. with an aim to overcome the challenges and problems arising in the existing sensing systems. Chapter I discusses about the general properties of CPEs and their vast applications in the field of chemical, biological and material science which had made them technologically promising materials for future. Chapter II highlighted the synthesis and characterization of conjugated polymer nanoparticles for the selective and sensitive detection of PA (well-known nitro-explosive) on multiple platforms including including aqueous solution, contact mode as well as in vapor phase. Chapter III described the synthesis and characterization of a new anionic conjugated polyelectrolyte and its application in the detection and removal of broad spectrum antibiotic tetracycline Tc from water samples. Chapter IV discussed the synthesis of cationic CPE which has been explored for the detection of widely used anionic surfactants SDS/SDBS in aqueous solution via the phenomenon of FRET. Furthermore, the polymer-surfactant assembly has been applied for the non-invasive detection of spermine (considered as an excellent biomarker for early cancer diagnosis) in urine samples. Chapter V discussed the synthesis of a new AIEE active CPE which finds it's practicability in the development of latent fingerprints on various substrates including plastic, glass, aluminium foil, metallic substrates, etc. without any additional treatment.