INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	Ph.D.

Thesis Title: **"STUDIES ON THE INTERACTION OF SMALL FLUORESCENT MOLECULES/NUCLEOSIDE WITH DUPLEX, G-QUADRUPLEX AND CALF THYMUS DNA"**

Name of Thesis Supervisor(s)	:	Prof. Subhendu Sekhar Bag
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SHORT ABSTRACT

It is known so far that DNAs can be good drug targets. Long telomeric DNA, which forms G-quadruplex, is also a potential drug target in cancer therapy. Hence, search of highly specific ligand is important for design of anticancer drugs. This not only directs the therapeutic applications but also helps in diagnosis of G rich gene sequence.

Chapter 2 describes design and synthesis of sovatochromic nucleoside probes for detection of SNPs. Naphthalene appended uridine nucleoside utilized for detection of matched base adenosine of target DNA via drastic change in fluorescence emission intensity. Chapter 3 describes the label free detection of homo pyrimidine mismatches, abasic site positioned opposite to pyrimidines and pyrimidine-bulge DNA over fully matched double stranded DNA using an unnatural tetrazolylpyrene nucleoside ($^{TzPy}\mathbf{B}_{Do}$) as a fluorescent probe. Chapter 4 describes the detection of higher order human telomeric G-quadruplex DNA over monomeric G-quadruplexes and other canonical topology of DNA. The probe tetrzolyl pyrene unnatural nucleoside ($^{TzPy}\mathbf{B}_{Do}$) successfully and specifically bound to dimeric G-qudrupex with generation of about 9-fold increase in fluorescent emission intensity compared to monomeric G-quadruplex. We proposed that the tetrzolyl pyrene unnatural nucleoside bound at the cleft between two consecutive G-quadruplexes and hold via intercalative stacking interaction. Chapter 5 briefly describes the synthesis of highly solvatochromic molecules (5.10 and 5.11) and exploited in bio sensing application. Thus, we successfully synthesized highly solvatochromic donor/acceptor substituted naphthalimide based fluorophores and investigated their photophysical properties. Furthermore, both the donor/acceptor substituted naphthalimide fluorophores were exploited in sensing calf-thymus DNA via switch-on fluorescence response.