INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: STUDIES ON DNA AS A BIORECOGNITION ELEMENT FOR THE DETECTION OF PLASMODIUM SPECIES LACTATE DEHYDROGENASE IN OPTICAL AND ELECTROCHEMICAL PLATFORMS

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SHORT ABSTRACT

Malaria management in developing countries is often plagued with the practice of self-treatment of suspected malaria cases due to limited access of patients to diagnostic centers. In these countries, drug resistant malaria is therefore on the rise. According to WHO, accurate and point-of-care diagnosis of malaria is prerequisite in malaria management as it reduces evolution of multi drug resistant malaria caused by indiscriminate and overuse of drugs, and lessens mismanagement of non-malaria fevers.

Plasmodium falciparum lactate dehydrogenase (PfLDH) has emerged as a highly promising biomarker target for malaria detection. Interestingly, PfLDH is overexpressed in the parasite and also differs structurally and kinetically from its human counterparts, making it a viable biomarker. ssDNA aptamer against PfLDH was screened using the SELEX process, where functionally active proteins from the human host namely, hLDH A, and hLDH B were used as control proteins to improve the specificity of screened candidates. Four independent proof-of-concepts using DNA based recognition system were then adapted, (A) Development of aptamer-gold nanoparticle based colorimetric detection of PfLDH, (B) Development of aptasensor for electrochemical detection of PfLDH, (C) DNA templated silver nanoclusters for fluorescence based detection of PfLDH and (D) High resolution melting of metallized DNA duplexes for species differentiation of Plasmodium parasite. Here, inherent material properties of DNA, and the intrinsic properties of nanomaterials were exploited for developing stable, sensitive, and specific sensing systems for *Plasmodium* species detection and differentiation.