



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

Name of the Student : **KULDEEP MAHATO**

Roll Number : **156106049**

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

Thesis Title:

**Design and Development of Proof-of-Concept Biosensors based on Engineered Surfaces and Nanomaterials**

Name of Thesis Supervisor(s) : **Dr. Pranjal Chandra**

Thesis Submitted to the Department/ Center : **Biosciences and Bioengineering**

Date of completion of Thesis Viva-Voce Exam : **September 09, 2019**

Key words for description of Thesis Work : **Bioengineering, Biosensors, Engineered Surface, Nanomaterials**

---

**SHORT ABSTRACT**

Biosensors are the bioanalytical tools and found great attention due to their various advantages over the conventional lab-based, time-consuming, sophisticated analytical systems. In recent days, the demand of miniaturization for various onsite application has triggered the fabrication process for the adoption of engineered surfaces and nanomaterials which not only supports the miniaturization but also improves the sensitivity of the biosensor. In this thesis work, we have developed sensor systems, which not just provide sensitive analyses, but these actually capable of detecting the analytes of industrial / clinical importance in significant levels. In addition, this thesis work is inclined to resolve the few contemporary griming issues, such as food safety and silent clinical diseases *viz.* hypovitaminosis, liver/bone diseases, and carcinoid syndromes. This thesis work comprises the development of four biosensors using engineered surfaces and nanomaterials. First biosensor is for the detection of the milk pasteurization based on a biomarker “alkaline phosphatase (ALP)”. The second biosensor is fabricated for the sensitive detection of bone and liver diseases based on “Serum ALP”, which is comparable to the commercially available techniques. Third developed biosensor is for the ultrasensitive electrochemical determination of vitamin C in the fruit juices and clinical samples. The developed sensor has also been used for the determination of vitamin C in the ex-vivo brain samples of the physiologically contrasting mice models. Fourth developed biosensor is to detect the serotonin level in the blood serum, which is found elevated in the clinical conditions of carcinoid syndromes.