INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : PAYEL DOWARI

Roll Number : 166122039

Programme of Study : Ph.D.

Thesis Title: **Exploration of Self-Assembly in Short Peptides for the Development of Useful Functional Materials**

Name of Thesis Supervisor(s) : DEBAPRATIM DAS

Thesis Submitted to the Department/ Center : CHEMISTRY

Date of completion of Thesis Viva-Voce Exam : 18-05-2022

Key words for description of Thesis Work : Peptide, Self-Assembly, Hydrogel

---

SHORT ABSTRACT

The thesis on 'Exploration of Self-Assembly in Short Peptides for the Development of Useful Functional Materials' deals with the design of novel short peptides, studying their self-assembly behaviour with the different non-covalent interactions, and exploring their possible applications in the field of peptide-based functional materials.

Chapter 1 is a brief introduction on peptide-based nanomaterials and their various applications with sufficient literature review.

Chapter 2 describes the development of a thixotropic hydrogel using the self-aggregation of a peptide amphiphile.

Chapter 3 describes the successful utilization of the technique of peptide coassembly for the formulation of a functional peptide hydrogel for aiming localized drug-delivery through receptor mediated cellular internalization mechanisms.

Chapter 4 deals in development of a multi-stimuli responsive cross-linked peptide polymer using different cross-linking methodologies, for attaining size-tunability property and controlled cell-proliferation.

Chapter 5 deals in development of an artificial hydrolase. The work involves systematic design and immobilization of a hydrolase-like short peptide amphiphile on silica surfaces for enhancement of extent of catalysis, improvement of catalyst stability and increased stereoselectivity, compared to the micellar aggregates.