



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Mechanism of Self-Assembly of Small Designer Peptides and Their Potential Applications

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Thesis Submitted to the Department/ Center : Chemistry

Date of completion of Thesis Viva-Voce Exam : 05.04.2021

Key words for description of Thesis Work : Self-assembly, Co-assembly, Peptides, Nanostructures, Drug delivery, Protein delivery, dye absorption, sensors, hydrogel, organogel

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**SHORT ABSTRACT**

The thesis "Mechanism of Self-Assembly of Small Designer Peptides and Their Potential Applications" describes the design of small peptides, studies on their self- and co-assembly and application of the developed materials in wastewater remediation and drug delivery. Several of the designed peptides also act as anion sensors.

The introductory chapter is an introduction to peptide self-assembly and briefly summarizes development in the field. It sets the pretext of the work undertaken in the current thesis. Chapter 2 describes the assembly of dicyclohexylurea derivatives of amino acids into organogels and their applications in wastewater remediation. The amino acid derivatives selectively sense fluoride and hydroxide anions. Chapter 3 involves design of two charge complementary peptides, development of self- and co-assembled hydrogels from them and their applications in wastewater remediation which involves removal of different kinds of organic dyes, metal ions including  $Pb^{2+}$  and  $Hg^{2+}$ . Peptides act as selective sensors for hydroxide ( $OH^-$ ), arsenite ( $AsO_2^-$ ) and arsenate ( $AsO_3^-$ ) anions. Chapter 4 describes the application of a peptide based hydrogel as drug delivery platform for topical delivery of several drugs and proteins. Chapter 5 discusses the mechanism of self-assembly of a tryptophan rich tetrapeptide into nanospherical assemblies. Chapter 6 contains concluding remarks, revisits lessons learnt and discusses the scope of future studies.