INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	Ph.D.
Thesis Title:		CREATING LIFE-LIKE TRANSIENCE IN SYNTHETIC VESICLES
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SHORT ABSTRACT

The thesis "**Creating Life-like Transience in Synthetic Vesicles**" explores several techniques and approaches for imbuing life-like non-equilibrium features in synthetic vesicular systems and their potential biomimetic applications in laboratory settings.

Chapter 1 provides a brief overview of transient out-of-equilibrium systems, the classification of various types of assembly processes based on their energy profiles, and the progress accomplished thus far in the field of non-equilibrium system chemistry.

Chapter 2 presents a novel strategy for constructing transient supramolecular peptide amphiphiles (SPA) based on cucurbit[8]uril and its vesicular assembly under the influence of a pH clock.

Chapter 3 focuses on the development of a cucurbit[8]uril based pH-responsive supramolecular peptide amphiphile (SPA) that transiently assembles into hydrolase mimetic vesicular nanozymes upon the addition of alkaline TRIS buffer (activator) but then instigates its self-destruction due to the catalytic generation of acidic by-products (deactivator).

Chapter 4 describes a chemoenzymatic pH clock mediated transient assembly of a vesicular nanozyme wherein the distinct confinement of two catalytically discrete units, histidine groups on the periphery and hemin in the lipid bilayer, results in an efficient hydrolase-peroxidase tandem catalysis in a temporally controlled fashion.

Chapter 5 discusses the multi-luminescent behaviour of a transiently breathing vesicular light-harvesting system in which variations in the luminescent characteristics of the entrapped FRET donor and acceptor molecules allow broad-spectrum luminescence tuning over the course of the pH regulated breathing cycles.