INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	Ph.D.

Thesis Title: Development of New Therapeutic Materials for Mitigation of Amyloid Neurotoxicity Associated with Alzheimer's Disease

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Alzheimer's disease (AD), an irreversible brain disorder, first diagnosed more than 100 years ago, still remains a curse to the society, affecting 30 million people worldwide, victimizing one in ten individuals above 65 years' age, due to lack of efficient therapeutic strategy. Intense research activity suggests that amyloid fibrils originating from self-aggregation of amyloid β peptide having cross-β sheeted conformation are the hallmark of this disease. Hence, inhibition of amyloid aggregation can offer a platform to develop early stage therapeutics against several neurodegenerative diseases including AD.

My research has been focused on design and development of new therapeutic materials for Alzheimer's Disease (AD). I have developed a wide range of organic materials that exhibits multidimensional anti-amyloidogenic activity with exceptional selectivity towards amyloid mediated neuronal damage *in vitro* and *in vivo* models. Newly developed probes was designed in a strategic manner such that it acquires nano dimensions in aqueous medium and helps it to translocate through the BBB under normal circulation to recover amyloid mediated internal hemorrhage in a wild type (WT) mice brain. These probes could efficiently chelate redox metals to inhibit metal dependent amyloid aggregation as well as arrest the redox cycle preventing ROS generation and protecting mitochondria from ROS mediated damage. The multidimensional activity of these probes was further evidenced by caspase activation and mitochondrial membrane potential (MMP) biomarkers and was complemented by brain histology and electron microscopy experiment. Overall, these extraordinary works have been achieved by performing spectroscopic, microscopic, biophysical and animal model experiments with great care and has taken a very long time to establish the mechanism associated with mitigation of amyloid triggered neurotoxicity. Overall, these newly developed materials offers a potential lead to develop anti-amyloidogenic materials which further paves the way to develop a potential therapeutic strategies to deal with AD.