INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: N-Propargylamines: A Key Precursor for the Construction of Functionalized Nitrogen and Sulfur Heterocycles

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SHORT ABSTRACT

The contents of the present thesis have been divided into five chapters based on the results achieved from the experimental works performed during the entire course of the PhD research programme. **Chapter 1** highlights an overview of *N*-propargylamines. This includes a brief discussion about synthetic reactivity and utility of *N*-propargylamines. It emphasizes on its unique structure bearing both free amine and an alkyne group, thus focusing on its dual role either as nucleophile and electrophile or as *N*-centered radical donor and radical acceptor. **Chapter 2** highlights an efficient methodology developed for the synthesis of tetra- and penta-substituted pyrroles *via N*-centered radical initiated oxidative self-dimerization of *N*-propargylamines catalyzed by silver benzoate in the presence of $K_2S_2O_8$. The protocol provides a simple route for the synthesis of highly functionalized pyrroles with two carbonyl groups in the side chain. The methodology can be extended towards the synthesis of fluorescent pyrrolo[3,4-d]pyridazine derivatives. **Chapter 3** represents an efficient methodology for the synthesis of both di- and trisubstituted thiazol-2-ones from N-propargylamines via [3,3]-sigmatropic rearrangement/5-exo-dig cyclization. The protocol utilizes silver(I) trifluoromethanethiolate ($AgSCF_3$) as a C–S source and eco-friendly H_2O as nucleophile under open air condition. The methodology can be extended for the synthesis of bioactive analog of thiozole-2-thione derivatives and photophysical properties have been studied for some synthesized compounds. **Chapter 4** describes an efficient methodology developed for the synthesis of methylene-dihydrothiazole derivatives *via* Michael-addition followed by hydrothiolation of *N*-propargylamines. The protocol utilizes silver(I)trifluoromethanethiolate ($AgSCF_3$) as a *S* source and malonate ester derivatives as nucleophiles. The reaction is compatible with many functional groups with moderated to good yield. **Chapter 5** highlights a facile and efficient synthesis of structurally diversified 2-pyridones is demonstrated using the [4+2] annulation of *in situ* generated azadienes from *N*-propargylamines and active-methylene compounds. The reaction is promoted by an inorganic base giving moderate to good yields. The developed methodology is applicable for direct and formal synthesis of various bioactive molecules. The synthetic utility of the protocol was also illustrated by late stage functionalization of the products.