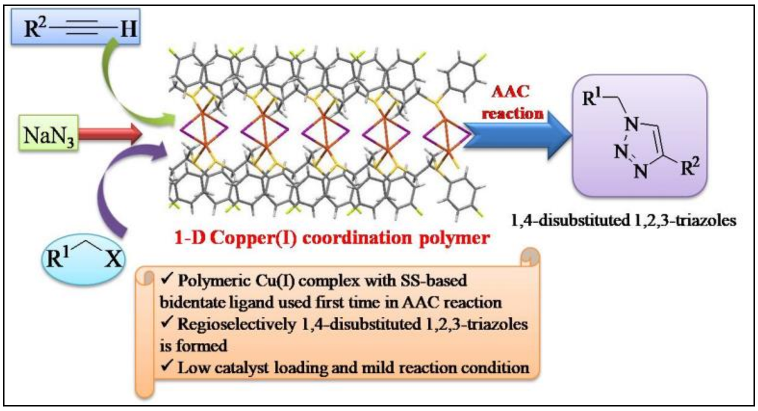
ABSTRACT

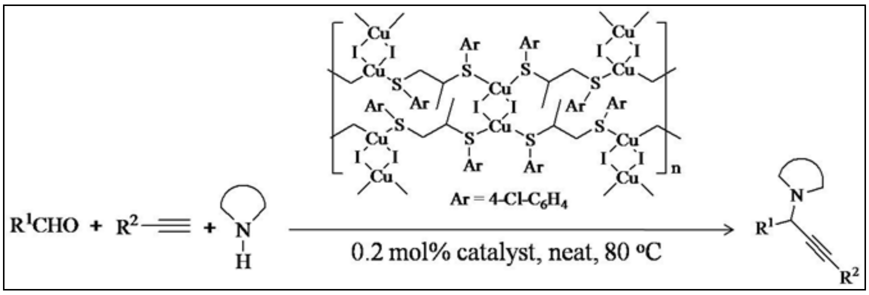
The research work embodied in this thesis entitled, **SYNTHESIS, CHARACTERIZATION OF TRANSITION METAL-DITHIOETHER COMPLEXES AND CATALYTIC APPLICATIONS IN ORGANIC REACTIONS** is primarily focused on the development of new dithioether ligands, their transition metal complexes and the characterization of these complexes by various methods like NMR, HRMS and Single Crystal XRD techniques. Another important aspect was to introduce these transition metal–dithioether complexes as catalytic system in various organic reactions. The overall work delineated herein has been divided into four chapters.

As a prelude to present work, the **Chapter I** covers a brief review on the recent development and trends towards the synthesis of dithioether ligands, various transition metal complexes of these ligands and catalytic applications of these Coordination Clusters, Metal Organic Frameworks towards various organic reactions. 1D, 2D, 3D–frameworks of various coordination polymers of these dithioether ligands with copper, silver, gold etc. and their coordination architectures has been well discussed under this chapter. Catalytic application of these coordination polymers towards various organic transformation has been also illustrated.

Chapter II depicts the preparation of a new 1D CuI–1,3–dithioether coordination polymer complex, characterization of the complex by NMR, HRMS and single crystal X–ray structure determination, and finally its efficient role as catalyst in azide–alkyne cycloaddition (AAC) reaction. Although few examples of other dithioether–based Cu(I) complexes are known in the literature, the present 1,3–dithioether ligand–based Cu(I) complex is not known, and there is no example of such complexes used as the catalyst for the AAC reaction. The present study therefore establishes a new and convenient catalytic system for the one–pot AAC in multi–component manner. The yields of the cycloadducts are excellent in diverse array of reactants. The applicability of the catalyst was also extended and 1,2,3–triazole compound with sulfur functionalized arms was synthesized in a multicomponent approach in one–pot two–step process.



Chapter III describes the synthesis of a new 2D CuI–1,2–dithioether coordination polymeric complex synthesized from CuI and 1-(1-{4-chlorophenylthio}propan-2-ylthio)-4-chlorobenzene, ($[(CuI)_2\{ArSCH_2CH(CH_3)SAr\}_2]_n$, Ar = 4-Cl-$C_6H_4$), and characterized by NMR, high resolution mass spectrometry (HRMS) and single crystal X–Ray Diffraction technique. The complex compound has been employed as suitable catalyst for solvent-free one-pot three-component A^3 coupling reaction. Variety of aromatic and aliphatic aldehydes, terminal alkynes and aliphatic cyclic secondary amines have been employed to prepare a library of propargylamines using the 2D–Cu complex at significantly low concentration (0.2 mol%).



In **Chapter IV** a simple and green method for the preparation of stabilized cuprous oxide nanoparticles (NPs) fairly dispersed and anchored with macroporous poly–ionic resins is developed (named as Cu_2O@ARF) and characterized by FT–IR, PXRD, XPS, HRTEM and ICP–AES. It was employed as an efficient recyclable heterogeneous catalyst for "on–water" three–component click reaction leading to the formation of diversely functionalized 1,2,3–triazoles. The resins with counter formate anions are believed to reduce Cu(II) to Cu(I) species and also help in stabilization the Cu_2O NPs and provide necessary immobilizing ambience on polymeric matrices thus negating additional reductant, ligands and capping agents. We further extended the reaction scope towards the synthesis of a dithiocarbamate based bio–active triazole compound possessing antitumor activity.