PREFACE

The experimental work embodied in the thesis entitled “Development of magnetic metal nanoparticles and their applications in organic synthesis” has been carried out in the Post-Graduate Department of Chemistry, University of Jammu, Jammu under the supervision of Prof. Satya Paul.

The challenges of the 21st century demand scientific and technological achievements that must be developed under the sustainable and environmentally benign conditions. In this vein, catalysis and green chemistry walk hand in hand on a pathway of rigorous principles that help to safeguard the health of our planet against negligent and uncontrolled production. Over the previous few years, nanotechnology based procedures have aided the development of economic and environmentally benign synthetic pathways to produce efficient and highly active catalytic nanomaterials. Recently, efforts of the scientific community have been directed towards the preparation of superparamagnetic nanoparticles for the design of magnetically retrievable nanocatalytic systems due to their exceptional physico-chemical properties and quick response to the applied magnetic field. Additionally, these magnetite-based nanocatalysts are robust, non-toxic, easy to prepare, magnetically recoverable, inexpensive and also recyclable. Subsequently, they have emerged as worthwhile alternatives to existing solid-supported heterogeneous catalysts. In this context, we have prepared a series of biomaterial, inorganic material and polymer functionalized magnetic metal nanoparticles based catalysts: Pd(0) nanoparticles immobilized onto starch stabilized amine functionalized magnetite nanoparticles, Cu(0) immobilized onto L-dopa grafted TiO₂ functionalized magnetite nanoparticles, and Co(0) immobilized onto L-dopa grafted magnetite nanoparticles functionalized graphene oxide and studied their applications in organic synthesis.

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