PREFACE

The thesis presents the investigation on the poly(D,L-lactide)-based amphiphilic block copolymers for drug delivery application carried out by me in the School of Biomedical Engineering (IIT) and Department of Chemistry, Banaras Hindu University, Varanasi, India. The research involves synthesis and characterization of well-defined linear, four arm star and triblock amphiphillic block copolymers with poly(D,L-lactide) as hydrophobic block and poly(*N*-vinylpyrrolidone) as hydrophilic block using ring opening polymerization and xanthate mediated reversible addition fragmentation chain transfer polymerization techniques. It also involves the synthesis and characterization of poly(D,L-lactide-co-glycolide) (PLGA)-*b*-PNVP amphiphilic block copolymers using alkyne-azide click reaction. These well-defined poly(D,L-lactide)-based amphiphilic block copolymers are explored as nano-carrier for drug delivery.

The thesis has five chapters starting with a general introduction about the basics of amphiphilic block copolymers, advantages of amphiphilic block copolymers, controlled/living polymerization techniques which are used in my research work and the objectives of the present investigation as Chapter 1. Chapter 2 and Chapter 3 deals with the synthesis and characterization of well-defined linear and star amphiphilic poly(D,L-lactide)-*b*-poly(*N*-vinylpyrrolidone) block copolymers *via* the combination of ROP and xanthate mediated RAFT polymerization and their *in vitro* sustained methotraxate (MTX) drug delivery and studied cell viability, cytotoxicity, apoptosis, hemolysis and anti-tumor activity against parental and MTX-resistant DL or Raji cells respectively. In the Chapter 4, the synthesis, characterization and the investigation

doxorubicin (DOX)-loaded poly(*N*-vinylpyrrolidone)-*b*-(poly(D,L-lactide)-*b*-poly(*N*-vinylpyrrolidone) amphiphilic triblock copolymers and their *in vitro* sustained drug delivery is presented. Finally in the last chapter 5 presents the synthesis and characterization of amphiphilic poly(D,L-lactide-*co*-glycolide)-*b*-poly(*N*-vinylpyrrolidone) diblock copolymers via ring opening copolymerization, xanthate mediated RAFT polymerization and alkyne-azide click reaction and their *in vitro* drug delivery and their cell viability, cytotoxicity and apoptosis against parental and DOX-resistant DL or Raji cells.