We have entered the 21st century, rather the new millennium, with tremendous growth prospects in rubber industry. Vast internal market, rapid industrialisation, improved living standard of the masses and the availability of all types of raw materials from within the country and the emergence of IT revolution etc have paved the way for the phenomenal growth of the rubber industry. With this growth the need for longer service life of rubber goods has become a challenge. A new class of antioxidants namely polymer-bound antioxidants have shown great potential in this regard. This thesis is about the synthesis, characterisation and uses of novel polymer-bound antioxidants.

This thesis is divided into eight chapters as follows:

Chapter 1 presents a review of the literature in this field and the scope of the present investigation.

Chapter 2 deals with the materials used and the experimental procedures adopted for the study.

Chapter 3 is divided into four parts. Part I is concerned with the preparation and characterisation of polyisobutylene-bound paraphenylene diamine antioxidant. Part II deals with the preparation and characterisation of chlorinated paraffin-wax bound paraphenylene diamine antioxidant. Part III covers the preparation and characterisation of polyethylene glycol-bound paraphenylene diamine antioxidant. Part IV includes the preparation and characterisation of polyisobutylene-bound diphenylamine antioxidant.

Chapter 4 is divided into two parts. Part I deals with the efficiency of polyisobutylene-bound paraphenylene diamine and chlorinated paraffin wax-bound paraphenylene diamine antioxidants in NR, NR modified bitumen, SBR, IIR and NBR. Part II deals with the use of polyisobutylene-bound diphenylamine and
polyethylene glycol-bound paraphenylenediamine antioxidants in NR. The accelerated ageing studies of these vulcanizates are also discussed in each part.

Chapter 5 is divided into two parts. Part I includes the preparation, characterisation and application of polyisobutylene-bound phenol in NR. Part II deals with the preparation, characterisation and application of 4-octadecyl phenol in NR.

Chapter 6 includes the ozone and flex crack resistance of NR, SBR, IIR and NBR vulcanizates and NR/BR and NR/SBR blends containing polymer-bound antioxidants in comparison with those with and without conventional antioxidant.

Chapter 7 deals with the effect of polyisobutylene-bound paraphenylenediamine and chlorinated paraffin wax-bound paraphenylenediamine antioxidants in NR/BR and NR/SBR blends in comparison with corresponding blends with and without antioxidant.

Summary and conclusions of the present investigation is described in the last chapter, Chapter 8.

At the end of each chapter a list of references has been given. A list of abbreviations used in this thesis is also cited.