New Polyisobutylene-Based Polymers – A Tribute to Professor Joseph P. Kennedy

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Polyisobutylene (PIB) is a synthetic elastomer, obtainable only through carbocationic addition polymerization, possessing excellent thermal, chemical, and oxidative stability, impermeability to gases, high mechanical damping, and biocompatibility. Its major uses include inner liners of automobile and truck tires, inner tubes, ball bladders, sealants, bubble gum base, protective clothing, and coatings for biomedical devices. Professor Kennedy has contributed immensely to the development of synthetic approaches to new functional polyisobutylenes, and as a tribute to him, this work will discuss two complimentary approaches to this problem. In the first approach, living carbocationic polymerization methods have been used to produce well-defined living PIB oligomers. The living ends are then end-quenched (trapped) by one of several types of nucleophiles, to produce useful terminal functionalities either through regiospecific elimination or addition to the chain end. In the second approach, a high molecular weight isobutylene copolymer is subjected to a reaction that cleaves the copolymer chain at the non-isobutylene comonomer units, and simultaneously functionalizes the newly formed chain ends to form telechelic polyisobutylenes.