

Structure and Properties of Polyester Elastomers Composed of Poly(butylene terephthalate) and Poly(ϵ -caprolactone)

Rubber, which shows very unique properties of low modulus and high extensibility, differently from other solids such as metal and ceramic, is now used in a variety of phases in daily life. To apply rubber to actual uses, vulcanization (i.e., the introduction of crosslinks) is needed. The disadvantage of this process is that rubber is not so high in productivity as well as operability. Recently, thermoplastic elastomers have been used to improve the processability of rubber materials, resulting in a major innovation in the rubber industry as well as in the field of polymer science. These rubber materials, which have no need for vulcanization and can be easily recycled, have attracted great scientific and academic interest.

The mechanical performance of the thermoplastic elastomers is strongly affected by the higher-order structure of hard segments of the chains. Typically, the domain is a glassy amorphous phase or a crystalline phase. Among the several types of thermoplastic elastomers, the polyester-type elastomers are specifically interesting because the mechanical properties cover from rubber to plastics, in some cases to engineering plastics, according to the structure of the crystalline domain of hard segments. The aim of this project is to make clear the structure-properties relation of polyester-type elastomers categorized in "engineering elastomers," composed of poly(butylene terephthalate) as the hard segment and poly(ϵ -caprolactone) or poly(tetramethyleneglycol) as the soft segment. The project is composed of the following six research topics:

- 1) molecular structure
 - blockiness/sequence distribution
 - molecular weight/ MW distribution
- 2) aggregate structure and deformation mechanism
 - POM studies
 - SAXS/WAXD studies
 - SALS studies
- 3) melt rheology
 - dynamic viscoelasticity
 - stress relaxation
 - shear/elongational viscosities
- 4) mechanical properties
 - stress-strain relationship

- elastic recovery/hysteresis
- 5) blends with other polymers
- 6) degradation

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Recent Advances in Electroanalytical Techniques: Characterization, Classification, and Terminology

The IUPAC technical report *Classification and Nomenclature of Electroanalytical Techniques* (Rules Approved 1975), *Pure Appl. Chem.*, **45** (2-C) 83, 1976, has not been updated for over 25 years. The material based on this document, which is embodied in chapter 8 of the IUPAC "Orange Book," is therefore also out of date. During recent decades, several electroanalytical techniques lost their importance (e.g., differential voltammetry or Kalousek polarography), while new techniques have been developed and have found widespread use (e.g., square wave voltammetry, electrochemical impedance spectroscopy, or hyphenated techniques, such as those accomplished with the use of the electrochemical quartz crystal microbalance). There is thus a clear need for a modern document concerning the characterization, classification, and recommendation of the relevant terminology for the new and currently used electroanalytical techniques.

The objective of this project is to revise and update the outdated IUPAC report and publish it in both print and electronic form. This will facilitate the updating of the Orange Book and relevant terms in the Gold Book. It will provide, in a concise form, a contemporary source of characterization, classification, and terminology of electroanalytical techniques for a broad audience of analytical, physical, inorganic, organic, environmental, and clinical chemists. These techniques are widely used in academic research and teaching laboratories as well as clinical, environmental, and industrial analytical laboratories.

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