

1. Record Nr.	UNINA9910874664603321
Autore	Ikeda Yuko
Titolo	Rubber Science : A Modern Approach
Pubbl/distr/stampa	Singapore : , : Springer, , 2024 ©2024
ISBN	9789819712670
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (272 pages)
Altri autori (Persone)	KatoAtsushi KohjiyaShinzo NakajimaYukio
Disciplina	678.2
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface to the Second Edition -- Preface to the First Edition -- Contents -- 1 Introduction to Rubber Science -- 1.1 Rubber and Elastomer -- 1.1.1 Material and Matter, Together with Information and Fact -- 1.1.2 Rubber Science, an Area in Material Science -- 1.1.3 Science Status Quo -- 1.2 Natural Rubber: A Unique Biopolymer -- 1.2.1 Agriculture and Biology on Natural Rubber -- 1.2.2 Characteristics of Natural Rubber -- 1.2.3 Synthetic Natural Rubber? -- 1.3 Rubber and Elastomer as Amorphous Polymers -- 1.3.1 Amorphous -- 1.3.2 Glass Transition Temperature -- 1.3.3 The Age of Soft Materials and Soft Technology -- References -- 2 Basic Science of Rubber -- 2.1 Chemistry I: Polymerization, Polymer Reaction, and In Situ Chemical Reaction -- 2.1.1 Polymerization: Synthetic Rubbers -- 2.1.2 Polymer Reaction: Chemical Modification of Rubber and Elastomer -- 2.1.3 In Situ Chemical Reaction of Rubber -- 2.2 Chemistry II: Cross-Linking Reaction -- 2.2.1 Invention and Development of Vulcanization -- 2.2.2 Organic Accelerator System for Vulcanization -- 2.2.3 Cross-Linking Reactions by Peroxides and Others -- 2.3 Physics: Rubber State and Rubber Elasticity -- 2.3.1 Rubber State and Free Volume -- 2.3.2 Rubber Elasticity (Entropic Elasticity) -- 2.3.3 Unique Role of Rubber in Elucidating the Nature of Macromolecule -- 2.3.4 Contribution of Rubber Elasticity Theory to Establishing

Macromolecular Science -- References -- 3 Material Science of Rubber  
-- 3.1 Beginning and Development of Material Science -- 3.1.1 Classical Period of Materials -- 3.1.2 Beginning of Material Science -- 3.1.3 Development of Material Science -- 3.2 Physical Properties of Materials -- 3.2.1 Mechanical Properties -- 3.2.2 Thermal Properties -- 3.2.3 Electrical Properties -- 3.2.4 Optical Properties -- 3.3 Development of Highly Functional Elastomeric Devices.  
3.3.1 High Functionality of Rubber and Elastomer -- 3.3.2 Elastomers for Lithium-Ion Conduction and the Secondary Battery -- 3.3.3 Bioactive Elastomers -- 3.4 Crystallization of Natural Rubber -- 3.4.1 Molecular Background and Analysis of Crystal Structure -- 3.4.2 Strain-Induced Crystallization: Template Crystallization -- 3.4.3 Low-Temperature Crystallization -- 3.5 Reactive Processing of Rubber and Thermoplastic Elastomers -- 3.5.1 Chemical Cross-Linking and Physical Cross-Linking -- 3.5.2 Rubber Processing from a Chemical Standpoint -- 3.5.3 Thermoplastic Elastomer: Elastomer Without Vulcanization? -- 3.5.4 Dynamic Vulcanizate: Thermoplastic Even with Cross-Linking? -- References -- 4 Recent Development of Rubber Science -- 4.1 Reinforcing Nanofillers and Their Aggregation -- 4.1.1 Rubber/Nanofiller Composite -- 4.1.2 Experimental of Three-Dimensional Transmission Electron Microscopy -- 4.1.3 Elucidation of Nanofiller Network Structure in Rubber Matrix -- 4.1.4 Mechanism of Rubber Reinforcement by Nanofillers -- 4.1.5 Evaluation of Free Volume by Positron Annihilation Lifetime Spectroscopy (PALS) -- 4.2 Modern Approaches to Network Structure of Rubber -- 4.2.1 Heterogeneity of Rubber Network by Small-Angle X-Ray and Neutron Scatterings -- 4.2.2 Cross-Linked Rubber Structure by Spectroscopies: X-ray Absorption Fine Structure (XAFS) and Time Domain Nuclear Magnetic Resonance (TD-NMR) Spectroscopies -- 4.2.3 Structural Analysis of Rubber Networks by Atomic Force Microscopy -- 4.3 New Development in Vulcanization Reaction -- 4.3.1 A New Reactive Intermediate of the Vulcanization Reaction -- 4.3.2 A New Reaction Mechanism of Vulcanization -- 4.3.3 New Paradigm of Vulcanization in the Twenty-First Century? -- References -- 5 Pneumatic Tire Technology -- 5.1 History of Tire Technology -- 5.1.1 Invention of Wheel and Development of Rubber Tire.  
5.1.2 Invention of Pneumatic Tire and Its Development -- 5.1.3 Technological Innovations of Pneumatic Tire After Steel Belted Radial Tire -- 5.2 Function of Pneumatic Tire -- 5.2.1 Four Functions of Tire -- 5.2.2 Elements in Designing Pneumatic Tire -- 5.3 Engineering Design of Pneumatic Tire -- 5.3.1 Shape Design of Tire -- 5.3.2 Structural Design of Tire -- 5.3.3 Design of Tread Pattern -- 5.4 Material Design of Pneumatic Tire -- 5.4.1 Materials for Tire -- 5.4.2 Viscoelastic Behaviors by Rubber Blending and by the End-Groups of Rubber Chains -- 5.4.3 Silica-Loaded Tire -- 5.5 Future of Automobile Tires -- 5.5.1 Social and Technical Environments Around Tire -- 5.5.2 Tire Technology in the Twenty-First Century -- References -- 6 Rubber Science and Technics Toward the Next Century: A Prospective View -- 6.1 Toward Sustainable Development Goals (SDGs) -- 6.1.1 What is SDGs? -- 6.1.2 Short History of the SDGs -- 6.1.3 The SDGs at Present -- 6.2 Automobiles and Transportation-Network Society -- 6.3 Rubber Science and Rubber Technics of the Next Generation? -- 6.3.1 Information, Communication, and Transportation -- 6.3.2 Rubber Science of the Next Generation -- References -- Summary and Acknowledgement -- Summary -- Acknowledgement -- Appendix -- Index.

---

