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Nota di contenuto	The Plasma Chemistry of Polymer Surfaces: Advanced Techniques for Surface Design; Contents; Preface; 1: Introduction; References; 2: Interaction between Plasma and Polymers; 2.1 Special Features of Polymers; 2.2 Processes on Polymer Surfaces during Plasma Exposure; 2.3 Influence of Polymer Type; 2.4 Methods, Systematic, and Definitions; 2.4.1 Surface Modification (Functionalization); 2.4.2 Coating of Polymer Surfaces with Functional Group-Bearing Plasma Polymers; 2.4.2.1 Plasma-Chemical Polymerization; 2.4.2.2 Pulsed-Plasma Polymerization; 2.4.3 Other Polymer Process; 2.4.3.1 Polymer Etching 2.4.3.2 Crosslinking2.5 Functional Groups and Their Interaction with Other Solids; References; 3: Plasma; 3.1 Plasma State; 3.2 Types of Low-Pressure Glow Discharges; 3.3 Advantages and Disadvantages of Plasma Modification of Polymer Surfaces; 3.4 Energetic Situation in Low-Pressure Plasmas; 3.5 Atmospheric and Thermal Plasmas for Polymer Processing; 3.6 Polymer Characteristics; 3.7 Chemically Active

Species and Radiation; References; 4: Chemistry and Energetics in Classic and Plasma Processes; 4.1 Introduction of Plasma Species onto Polymer Surfaces
4.2 Oxidation by Plasma Fluorination and by Chemical Fluorination4.3 Comparison of Plasma Exposure, Ionizing Irradiation, and Photo-oxidation of Polymers; References; 5: Kinetics of Polymer Surface Modification; 5.1 Polymer Surface Functionalization; 5.1.1 Kinetics of Surface Functionalization; 5.1.2 Unspecific Functionalizations by Gaseous Plasmas; 5.2 Polymer Surface Oxidation; 5.2.1 Polyolefins; 5.2.2 Aliphatic Self-Assembled Monolayers; 5.2.3 Polyethylene; 5.2.4 Polypropylene; 5.2.5 Polystyrene; 5.2.6 Polycarbonate; 5.2.7 Poly (ethylene terephthalate)
5.2.8 Summary of Changes at Polymer Surfaces on Exposure to Oxygen Plasma5.2.9 Categories of General Behavior of Polymers on Exposure to Oxygen Plasma; 5.2.10 Role of Contaminations at Polymer Surfaces; 5.2.11 Dependence of Surface Energy on Oxygen Introduction; 5.3 Polymer Surface Functionalization with Amino Groups; 5.3.1 Ammonia Plasma Treatment for Introduction of Amino Groups; 5.3.2 Side Reactions; 5.3.3 Instability Caused by Post-Plasma Oxidation; 5.3.4 Exposure of Self-Assembled (SAM) and Langmuir-Blodgett (LB) Monolayers to Ammonia Plasma
5.3.5 XPS Measurements of Elemental Compositions5.3.6 ToF-SIMS Investigations; 5.3.7 ATR-FTIR; 5.3.8 CHN Analysis; 5.3.9 NMR; 5.3.10 Discussion of Hydrogenation and Amination of Polyolefins by Ammonia Plasma; 5.4 Carbon Dioxide Plasmas; 5.5 SH-Forming Plasmas; 5.6 Fluorinating Plasmas; 5.7 Chlorination; 5.8 Polymer Modification by Noble Gas Plasmas; References; 6: Bulk, Ablative, and Side Reactions; 6.1 Changes in Supermolecular Structure of Polymers; 6.2 Polymer Etching; 6.3 Changes in Surface Topology; 6.4 Plasma Susceptibility of Polymer Building Blocks; 6.5 Plasma UV Irradiation
6.6 Absorption of Radiation by Polymers

Sommario/riassunto

This book illustrates plasma properties, polymer characteristics, surface specifics, and how to purposefully combine plasma and polymer chemistry. In so doing, it covers plasma polymerization, surface functionalization, etching, crosslinking, and deposition of monotype functional-group-bearing plasma polymers. It explains different techniques and plasma types, such as pressure-pulsed, remote, low-wattage plasmas and plasma polymerization in liquids. Finally, among the numerous applications discussed are plasmas for chemical synthesis, industrial processes or the modification of membranes and p