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| Nota di contenuto | Aryl Diazonium Salts: New Coupling Agents in Polymer and Surface Science; Contents; Preface; List of Contributors; 1: Attachment of Organic Layers to Materials Surfaces by Reduction of Diazonium Salts; 1.1: A Brief Survey of the Chemistry and Electrochemistry of Diazonium Salts; 1.2: The Different Methods that Permit Grafting of Diazonium Salts; 1.2.1: Electrochemistry; 1.2.2: Reducing Substrate, Homolytic Dediazonation, Reaction with the Substrate; 1.2.3: Reducing Reagent; 1.2.4: Neutral and Basic Media; 1.2.5: Ultrasonication; 1.2.6: Heating and Microwave; 1.2.7: Mechanical Grafting 1.2.8: Photochemistry 1.3: The Different Substrates, Diazonium Salts, and Solvents that Can Be Used; 1.3.1: Substrates; 1.3.2: Diazonium Salts; 1.3.3: Solvents; 1.4: Evidence for the Presence of a Bond between the Substrate and the Organic Layer; 1.4.1: Stability of the Layer; 1.4.2: Spectroscopic Evidence for a Bond; 1.5: From Monolayers to Multilayers; 1.5.1: Monolayers; 1.5.2: Layers of Medium Thickness; 1.5.2.1 Thick Layers; 1.6: Structure and Formation of Multilayers; 1.6.1: Chemical Structure; 1.6.2: The Spatial Structure of the Layers; 1.6.3: |

Compactness of the Layers

1.6.4: Swelling of the Layer 1.6.5: Electron Transfer through the Layers; 1.6.6: The Formation Mechanism of Multilayers; 1.7: Conclusion; References; 2: Aryl-Surface Bonding: A Density Functional Theory (DFT) Simulation Approach; 2.1: Introduction; 2.2: Density Functional Theory; 2.3: Bonding between Aryl and Various Substrates; 2.3.1: On Graphite/Graphene; 2.3.1.1 On the Basal Plane; 2.3.1.2 On the Edges of Graphene; 2.3.2: On Carbon Nanotubes; 2.3.3: On Metal Surfaces; 2.4: Summary and Outlook; Acknowledgments; References; 3: Patterned Molecular Layers on Surfaces 3.1: Methods Based on Scanning Probe Lithography 3.1.1: AFM; 3.1.2: SECM; 3.1.3: Spotting; 3.2: Methods Based on Soft Lithography; 3.2.1: Printing; 3.2.2: Molds; 3.2.3: Nanosphere Lithography; 3.3: Methods Based on Lithography; 3.4: Methods Based on Surface-Directed Patterning; 3.4.1: Modification of Si Surfaces; 3.4.2: Modified Electrode Arrays; 3.5: Summary and Conclusions; References; 4: Analytical Methods for the Characterization of Aryl Layers; 4.1: Introduction; 4.2: Scanning Probe Microscopies; 4.3: UV-VIS Spectroscopy: Transmission, Reflection, and Ellipsometry; 4.4: IR Spectroscopy 4.4.1: Transmission Spectroscopy 4.4.2: Reflection Spectroscopy; 4.4.3: Infrared Spectroscopic Ellipsometry (IRSE); 4.4.4: IRSE Surface Characterization; 4.4.5: In Situ IR Spectroscopy: ATR and IRSE; 4.5: Raman Spectroscopy and Surface-Enhanced Raman Scattering (SERS); 4.6: X-ray Photoelectron Spectroscopy (XPS); 4.7: X-ray Standing Waves (XSW); 4.8: Rutherford Backscattering; 4.9: Time of Flight Secondary Ion Mass Spectroscopy; 4.10: Electrochemistry; 4.11: Contact Angle Measurements; 4.12: Conclusion; References; 5: Modification of Nano-objects by Aryl Diazonium Salts; 5.1: Introduction 5.2: Electrochemical Modification of Nano-objects by Reduction of Diazonium Salts

Sommario/riassunto

Diazonium compounds are employed as a new class of coupling agents to link polymers, biomacromolecules, and other species (e. g. metallic nanoparticles) to the surface of materials. The resulting high performance materials show improved chemical and physical properties and find widespread applications. The advantage of aryl diazonium salts compared to other surface modifiers lies in their ease of preparation, rapid (electro)reduction, large choice of reactive functional groups, and strong aryl-surface covalent bonding. This unique book summarizes the current knowledge of the surface and