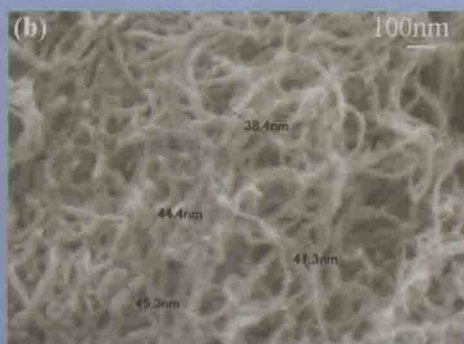
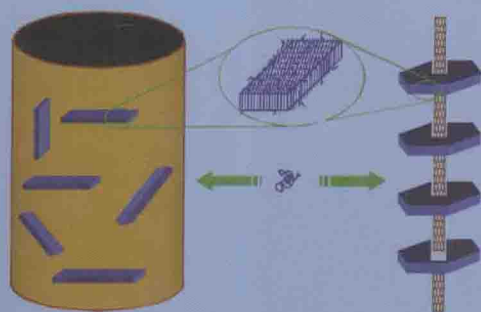
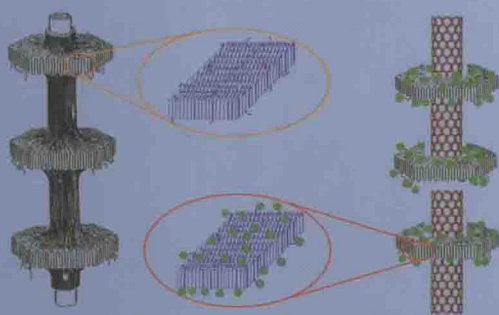


Polyolefin Composites

Edited by
Domasius Nwabunma
Thein Kyu



POLYOLEFIN COMPOSITES

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Preface

Polyolefins are the most widely used commodity thermoplastics. The polyolefin field remains the most vibrant area in polymer research largely driven by the synthesis of novel polyolefins using single-site catalysts. Today, it is possible to design novel polyolefin homopolymers, copolymers, and terpolymers with precise control of chain architecture (e.g., linear chain with regular side-branching, comblike, or star-shaped topologies), microstructures, and molecular weight distributions that are hard to come by in conventional Ziegler–Natta olefin polymerization.

Polyolefin composites are a subset of polymer composites that emerged as a result of the need to meet application requirements not satisfied by synthesized neat polyolefins. In comparison to other subsets of polymer composites, polyolefin composites have distinct advantages of lower density, lower cost, processing ease, and good combination of chemical, physical, and mechanical properties. In the last several years, the research and usage of polyolefin composites have increased dramatically due to new application opportunities (e.g., in construction and transportation) and the synthesis of novel polyolefins.

To the best of the editors' knowledge, there is currently no single book that focuses exclusively on polyolefin composites. Moreover, it is important to capture in a book format the latest developments in nanostructured polyolefin composites such as polyolefin/clay nanocomposites, polyolefin nanofiber composites, and polyolefin/carbon nanotube composites. These are the two motivations to publish this book.

The chapters are organized as follows: Chapter 1 provides an overview of polyolefin composites by first introducing polyolefins as a significant class of soft materials, preparation, and reinforcement through incorporation of inorganic and organic particles and fibers. This introductory chapter further examines emerging trends in polyolefin composites research and development. The contributed chapters are divided fairly evenly among three categories, namely microcomposites (Chapters 2–7), nanocomposites (Chapters 8–14), and advanced nano- and molecular composites (Chapters 15–20). All of these chapters cover preparation, characterization, and properties of polyolefin composites at various structural levels. Chapters 15 and 16 provide new insights into fundamental theoretical understanding of nanostructured polyolefin composites from molecular perspectives through advanced modeling and simulation.

The book covers several aspects of polyolefin composites such as processing, morphological characterization, crystallization, structure and properties, and performance evaluation at micro- and nanostructural levels. Processing covers *in situ* reactive blending, functionalization, compatibilization, and addition of micro- or nanosized inorganic or organic additives of natural or synthetic origin having different functional capabilities to improve performance or to aid processing.

This book is intended to serve as a valuable reference for academic and industrial professionals engaged in research and development activities in the specific area of polyolefin composites or in the general area of polymer composites. Some review chapters are written at an introductory level to attract newcomers including senior undergraduate and graduate students and to serve as a reference book for professionals from other disciplines. Since this book is the first of its kind devoted solely to polyolefin composites, it is hoped that it will be sought after by a broader technical audience. Some knowledge of polymer chemistry, physics, and engineering, although are not strictly essential, would be helpful to better appreciate the technical contents of some chapters.

All chapters were contributed by renowned professionals from academia, industry, and government laboratories from various countries and were peer reviewed in accordance with guidelines utilized elsewhere by top-rated polymer journals. The editors would like to thank all contributors for believing in this endeavor, sharing their views and precious time, and obtaining supporting documents. Finally, the editors would like to express their gratitude to the external reviewers whose contributions helped improve the quality of this book.

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Contents

Preface	xv
Contributors	xvii

Part I Introduction 1

1. Overview of Polyolefin Composites	3
1.1 Introduction	3
1.2 Olefinic Monomers	4
1.3 Polyolefin Homopolymers, Copolymers, and Terpolymers	5
1.4 Polyolefin Composites	7
1.5 Trends in Polyolefin Composites	14
Nomenclature	16
References	17

Part II Polyolefin Micro Composites 29

2. Polypropylene Natural Cellulosic Fiber Composites	31
2.1 Introduction	31
2.2 Applications of Polypropylene Composites	32
2.3 Preparation Techniques for Polypropylene Composites	33
2.4 Fiber Surface and Polypropylene Modifications	36
2.5 Forming of Polypropylene Composite	38
2.6 Composite Morphology and Polypropylene Crystallization	38
2.7 Mechanical Properties	39
2.8 Additives and Complementary Structures	40
2.9 Conclusions	41
Nomenclature	42
References	42
3. Polyolefin/Natural Fiber Composites	44
3.1 Introduction	44
3.2 Structure and Properties of Plant Fibers	46

3.2.1	Chemical Structure and Applications	47
3.2.2	Cellulose Microfibrils	48
3.3	Surface Modification of Plant Fibers	50
3.3.1	Physical Treatments	50
3.3.2	Physicochemical Treatments	51
3.3.3	Chemical Modification of Plant Fibers	54
3.4	Polyolefin Composites	63
3.4.1	Processing of Polyolefin/Natural Fiber Composites	63
3.4.2	Mechanical Properties of Polyolefin/Natural Fiber Composites	64
3.4.3	Dynamic Mechanical Properties of Polyolefin/Natural Fiber Composites	71
3.4.4	Rheological Properties of Polyolefin/Natural Fiber Composites	72
3.4.5	Thermoanalytical Properties of Polyolefin/Natural Fiber Composites	72
3.4.6	Electrical Properties of Polyolefin/Natural Fiber Composites	73
3.4.7	Water Absorption by Polyolefin/Natural Fiber Composites	75
3.4.8	Nanocomposites	76
3.5	Characterization of Polyolefin/Fiber Interfaces	77
3.6	Applications of Polyolefin Composites	78
3.7	Conclusions	81
	Nomenclature	81
	References	82

4. Composites of Polyolefins and Some Polyolefin/Polyamide Blends as Matrices and Calcium Carbonate, Wood Flour, Sisal Fiber, Hydroxyapatite, and Montmorillonite as Fillers **87**

4.1	Introduction	87
4.2	Composites of Polypropylene and High Density Polyethylene with Calcium Carbonate	88
4.2.1	Mechanical Properties	88
4.2.2	Influence of the Mixing Conditions on the Dispersion of the Filler	89
4.2.3	Surface Modifiers for Calcium Carbonate	90
4.2.4	Thermal Properties	94
4.3	Composites of Polypropylene and High Density Polyethylene with Wood Flour and Sisal Fibers	95
4.3.1	Mechanical Properties	96
4.3.2	Thermal Properties	101
4.3.3	Influence of the Gamma Radiation on the Behavior of the Composites	104
4.4	Composites of Polypropylene and High Density Polyethylene with Hydroxyapatite	106
4.4.1	Influence of the Composite Preparation Methods on Its Mechanical Properties	107
4.4.2	Modification of the HA Particles Surface and Its Influence on the Tensile Properties	111

4.4.3	Influence of Gamma Radiation on the Composites	113
4.5	Composites of Polyolefins/Polyamide 6 with Montmorillonite	116
4.5.1	Mechanical Properties	118
4.5.2	Influence of Different Compatibilizing Agents	118
4.5.3	Analysis of the Physical, Mechanical, Thermal, and Morphological Properties of Composites	119
4.6	Conclusions	123
	Nomenclature	124
	References	125
5.	Ethylene–Propylene–Diene Rubber/Carbon Black Composites	129
5.1	Introduction	129
5.2	Composite Preparation	130
5.3	Characterization of Composites	131
5.3.1	^{129}Xe -NMR Studies	131
5.3.2	^1H NMR Studies	132
5.4	Morphology of Composites	134
5.5	Mechanical and Viscoelastic Properties	135
5.5.1	Mechanical Properties	135
5.5.2	Viscoelastic Properties	137
5.6	Rheological Properties	138
5.7	Conductive Properties	140
5.8	Aging Properties	144
5.9	Applications	145
5.10	Conclusions	146
	Nomenclature	146
	References	147
6.	Selected Topics on Polypropylene/Wood Flour Composites: Thermal, Mechanical, and Time-Dependent Response	150
6.1	Introduction	150
6.2	Interfacial Compatibilization: Addition of Maleated Polypropylene and Chemical Modification of Wood Flour	152
6.3	Composite Preparation: Processing Methods	154
6.4	Thermal Behavior: Thermal Degradation and Dynamic Mechanical Properties	157
6.5	Mechanical Behavior: Tensile, Flexural, and Impact Properties	162
6.6	Time-Dependent Response: Short- and Long-Term Creep	167
6.6.1	Effect of Processing Conditions and Wood Flour Concentration	167
6.6.2	Effect of Interfacial Modification	170
6.6.3	Effect of Temperature	170
6.7	Conclusions	173
	Nomenclature	174
	References	175

7. Deformation and Fracture Behavior of Natural Fiber Reinforced Polypropylene **178**

7.1	Introduction	178
7.2	Effect of Loading Conditions	181
7.3	Microstructural Effects	181
7.3.1	Fiber Breakage	183
7.3.2	Fiber Agglomeration	184
7.3.3	Fiber Orientation	185
7.3.4	Transcrystallinity	186
7.4	Deformation Behavior	187
7.5	Fracture Behavior	191
7.5.1	Quasistatic Loading Conditions	191
7.5.2	Impact Loading Conditions	192
7.6	Failure Mechanisms	195
7.7	Conclusions	199
	Nomenclature	200
	References	201

Part III Polyolefin Nano Composites **205**

8. Metallocene Catalyzed Functionalized Polyolefins in Composites **207**

8.1	Introduction	207
8.2	General Functionalization Approaches	208
8.3	Functionalized Polyolefins through Metallocene Catalysis	209
8.4	Compatibilization of Polyolefin Composites	211
8.4.1	Background	211
8.4.2	Functionalized Olefin Copolymers in Melt Compounding	212
8.4.3	<i>In situ</i> Polymerization	219
8.5	Conclusions	223
	Nomenclature	224
	References	224

9. Polyethylene/Layered Silicate Nanocomposites: Preparation and Properties **228**

9.1	Introduction	228
9.2	Preparation Strategies and Morphological Study	229
9.2.1	Melt Intercalation	230
9.2.2	<i>In situ</i> Polymerization Method	231
9.3	Properties of Polyethylene/Layered Silicate Nanocomposites	234

9.3.1	Tensile Properties	234
9.3.2	Dynamic Mechanical Analysis	236
9.3.3	Gas Barrier Properties	237
9.3.4	Thermal Stability	238
9.3.5	Flammability Properties	239
9.3.6	Photooxidative Degradation	240
9.3.7	Thermal Expansion and Thermal Conductivity	241
9.4	Polyethylene/Clay Nanocomposites Exposed to High Energy Irradiation	242
9.5	Crystallization Behavior of Polyethylene-Based Nanocomposites	243
9.6	Rheological Properties and Processability	245
9.7	Conclusions	248
	References	248
10.	Polypropylene/Clay Nanocomposites	251
10.1	Introduction	251
10.2	Structure and Properties of Clay	252
10.3	Typical Morphologies of Polymer/Clay Hybrids	253
10.4	Preparation of PP/Clay Nanocomposites	254
10.4.1	Clay Modification	254
10.4.2	Fabrication of PP/Clay Nanocomposites	257
10.5	Characterization of PP/Clay Nanocomposites	264
10.5.1	Microstructures	264
10.5.2	Thermal Transitions and Stability	267
10.5.3	Mechanical Properties	268
10.5.4	Thermomechanical Behaviors	272
10.5.5	Rheological Behaviors	275
10.5.6	Other Properties	276
10.6	Applications of PP/Clay Nanocomposites	277
10.7	Conclusions and Future Trends	278
	Nomenclature	279
	References	279
11.	Polyolefin/Layered Double Hydroxide (LDH) Nanocomposites: Preparation, Structure, and Properties	283
11.1	Introduction	283
11.2	Synthesis and Characterization of Organomodified LDH	286
11.3	Preparation of Polyolefin/LDH Nanocomposites	290
11.4	Structure and Morphology of Polyolefin/LDH Nanocomposites	292
11.5	Rheological Properties of Polyolefin/LDH Nanocomposites	295
11.6	Thermal Properties of Polyolefin/LDH Nanocomposites	298
11.7	Thermal Stability of Polyolefin/LDH Nanocomposites	300
11.8	Mechanical Properties of Polyolefin/LDH Nanocomposites	302
11.9	Flame-Retardant and Gas Barrier Properties of Polyolefin/LDH Nanocomposites	305

11.10 LDH Versus MMT in Polyolefin Nanocomposites	305
11.11 Conclusions	306
Nomenclature	307
References	309

12. Effect of Nanofillers on Crystallization, Phase Transformation, and Thermomechanical Behavior of Poly(1-Butene) 311

12.1 Introduction	311
12.1.1 Crystallization and Phase Transformation of PB	312
12.1.2 Polymer Nanocomposites	313
12.1.3 Preparation of PB Nanocomposites	314
12.2 PB/Clay Nanocomposites	315
12.2.1 Clay	315
12.2.2 Structure Evaluation	317
12.2.3 Nonisothermal Crystallization	318
12.2.4 Isothermal Crystallization	321
12.2.5 Optical Microscopy	323
12.2.6 Phase Transformation	323
12.2.7 Dynamic Mechanical Analysis (DMA)	325
12.2.8 Thermogravimetric Analysis	326
12.3 PB/MWCNT Nanocomposites	327
12.3.1 Carbon Nanotubes	327
12.3.2 Morphology	328
12.3.3 Nonisothermal Crystallization	328
12.3.4 Isothermal Crystallization	329
12.3.5 Optical Microscopy	329
12.3.6 Phase Transformation	331
12.3.7 Dynamic Mechanical Analysis	332
12.3.8 Thermogravimetric Analysis	334
12.4 PB/BaTiO ₃ Nanocomposites	334
12.4.1 Nanoparticles	334
12.4.2 Morphology	335
12.4.3 Nonisothermal Crystallization	335
12.4.4 Isothermal Crystallization	336
12.4.5 Optical Microscopy	337
12.4.6 Phase Transformation	337
12.4.7 Dynamic Mechanical Analysis	338
12.4.8 Thermogravimetric Analysis	339
12.5 Effect of Nanofillers on the Rate of Phase Transformation	340
12.6 Conclusions	341
Acknowledgments	343
Nomenclature	343
References	343

13. Toward Polyethylene Nanocomposites with Controlled Properties 346

13.1	Introduction	346
13.2	Optimizing Dispersion of Nanofillers	349
13.3	Characterizing Dispersion in Polyethylene Nanocomposites	352
13.3.1	Conventional Techniques: X-ray Diffraction and Electron Microscopy	352
13.3.2	Small-Angle Scattering	353
13.4	Conclusions	359
	Acknowledgments	360
	Nomenclature	360
	References	361

14. Polyolefin–Silicate Nanocomposites: Mechanical Properties and Fracture Mechanics 365

14.1	Introduction	365
14.2	Structure of Polyolefin/Silicate Nanocomposites	369
14.2.1	Polyethylene/Montmorillonite Nanocomposites	371
14.2.2	Polypropylene/Montmorillonite Nanocomposites	378
14.2.3	Polyolefin/Vermiculite Nanocomposites	380
14.2.4	Effect of Elastomer Additions	384
14.3	Mechanical Properties	389
14.4	Patent Processes	399
14.5	Essential Work of Fracture (EWF)	402
14.6	Conclusion	410
	Nomenclature	410
	References	411

Part IV Advance Polyolefin Nano and Molecular Composites 415**15. Polyolefin/Clay Nanocomposites: Theory and Simulation 417**

15.1	Introduction	417
15.2	Nanocomposite Morphology, Thermodynamics, and Phase Behavior	419
15.2.1	Exfoliated, Intercalated, and Immiscible Nanocomposite Morphologies	420
15.2.2	Tailoring Polymers and Clays to Promote Exfoliation	422
15.2.3	Modeling Macroscopic Phase Behavior of Polymer–Clay Mixtures	427
15.2.4	Interpreting Morphology Using X-ray Scattering Data	430
15.3	Nanocomposite Rheology and Dynamics	431
15.3.1	Intercalation Dynamics	431
15.3.2	Nanocomposite Rheology	434

15.4	Prediction of Nanocomposite Properties	436
15.4.1	Common Features Between Predictive Methods	436
15.4.2	General Classes of Predictive Methods	438
15.4.3	Thermoelastic Property Modeling	440
15.4.4	Transport Property Modeling	443
15.5	Conclusions	444
	Acknowledgment	445
	Nomenclature	445
	References	446
16.	Monte Carlo Modeling of Polyethylene Nanocomposites Using a High Coordination Lattice	449
16.1	Introduction	449
16.1.1	Computer Simulations of Spherical Nanocomposites	453
16.2	Simulation Method	454
16.2.1	Second Nearest Neighbor Diamond Lattice	454
16.2.2	Simulation Setup	463
16.3	Simulation Results	466
16.3.1	Chain Structure (Static Properties)	467
16.3.2	Chain Dynamics	473
16.3.3	Adsorption–Desorption Dynamics	477
16.4	Conclusions	482
	Nomenclature	483
	References	484
17.	Characteristics of Multiwall Carbon Nanotube and Polyethylene Composites Prepared by Gelation/Crystallization from Solutions	486
17.1	Introduction	486
17.2	Characteristics of UHMWPE, EMMA, and Two Kinds of MWNTs	488
17.3	Advantage of Preparing UHMWPE–MWNT Composite by Gelation/Crystallization	489
17.4	Characteristics of UHMWPE–MWNT Composites	494
17.4.1	Morphology of the Drawn UHMWPE–MWNT Composite Film	494
17.4.2	Mechanical Property of the Undrawn and Drawn Composite Films	497
17.4.3	Electrical Conductivity of UHMWPE–MWNT Composite Films Dependent on the Temperature	499
17.4.4	Effect of Iodine Doping on the Electrical and Thermal Properties of UHMWPE–MWNT Composites	501
17.5	Uniform Mixing of UHMWPE and Rigid MWNTs with Ordered Graphene Sheets	509
17.6	Conclusions	519
	Nomenclature	520
	References	521

18. Crystallization Behavior of Polyethylene/Carbon Nanotube Composites	523
18.1 Introduction	523
18.1.1 Structure and Properties of Carbon Nanotubes	523
18.1.2 Carbon Nanotube Nanocomposites	525
18.2 Experimental	526
18.2.1 Materials	526
18.2.2 Experimental Procedure	526
18.3 Results and Discussions	527
18.3.1 PE/CNT Nanohybrid Shish-Kebabs Via Solution Crystallization	527
18.3.2 PE CNT Nanohybrid Shish-Kebabs Via Physical Vapor Deposition	533
18.3.3 PE/CNT Nanocomposites	537
18.4 Conclusions	547
Acknowledgment	547
Nomenclature	547
References	548
19. Formation of Shish-Kebab Structures in Ultrahigh Molecular Weight Polyethylene (UHMWPE)/Low Molecular Weight Polyethylene (LMWPE) Composites Under Shear Flow	552
19.1 Introduction	552
19.2 Experimental	554
19.2.1 Materials	554
19.2.2 DPLS Measurements	554
19.2.3 SAXS Measurements	555
19.2.4 SANS Measurements	555
19.3 Results and Discussion	556
19.3.1 Depolarized Light Scattering Measurements	556
19.3.2 Small-Angle X-Ray Scattering Measurements	561
19.3.3 Small-Angle Neutron Scattering Measurements	567
19.4 Conclusions	572
Nomenclature	573
References	574
20. Template Crystallization of Ultrahigh Molecular Weight Polypropylene Induced by Chain Orientation of Cocrystallized Ultrahigh Molecular Weight Polyethylene	577
20.1 Introduction	577
20.2 Materials and Methods	579
20.2.1 Sample Preparation	579
20.2.2 Characterization	580