

Contents

Preface *ix*

Abbreviations *xi*

Acknowledgments *xv*

Author Biographies *xvii*

1	Description of Diamondoids	1
1.1	Nomenclature	2
1.2	Strain	5
1.3	Preparation of Diamondoids	8
1.4	Physical Properties of Diamondoids	14
1.5	Spectroscopy of Diamondoids	18
1.6	Ionization Potentials	23
1.7	Electron Affinities	24
1.8	Vibrational Spectroscopy	25
	References	28
2	Naturally Occurring Diamondoids	35
2.1	Diamondoid Occurrence in the Earth's Crust	38
2.2	Diamondoids in Geochemical Studies	40
2.3	Diamondoid Formation in the Earth's Crust	42
2.4	Large-scale Isolation of Natural Diamondoids	44
2.5	Alternative Natural Sources of Diamondoids	48
2.6	Other Diamondoid Derivatives in Nature	50
	References	52
3	Diamondoids as Alkane CH Activation Models	63
	References	69
4	Preparative Diamondoid Functionalizations	75
4.1	Halogenations	75
4.2	Diamondoid Alcohols and Ketones	83
4.3	Carboxylic Acids and Their Derivatives	98
4.4	Nitrogen-Containing Compounds	103

4.5	Phosphorous- and Sulfur-Containing Compounds	108
4.6	Single Electron Oxidations of Diamondoids	113
4.7	Other Diamondoid Derivatives	118
	References	121
5	Diamondoid Self-Assembly	137
5.1	Adamantane-Containing SAMs on Surfaces	137
5.2	Higher Diamondoids for SAM Formation	146
5.3	Pristine Diamondoids on Surfaces	157
5.4	Other Applications of Diamondoid SAM Materials	157
5.5	Adamantane-stabilized Metal Nanoparticles	160
	References	162
6	Growing Diamond Structures from Diamondoids Via Seeding	171
6.1	Diamondoid-Promoted Growth of Diamond Under HT-HP or CVD Conditions	171
6.2	Higher Diamondoids for Diamond Nucleation	177
6.3	Diamond Growth Inside Nanotubes	180
	References	186
7	Diamondoid Polymers	193
7.1	Polymers Based on 1-Adamantyl-1-adamantane (1ADAD)	194
7.2	Polymers Based on Monofunctionalized Diamantanes	197
7.3	Polymers Based on Difunctionalized Diamantanes	199
	References	207
8	Diamondoids in Catalysis	213
	References	232
9	Medicinal Compounds	239
	References	245
10	Supramolecular Architectures	251
	References	270
11	Diamondoid Oligomers	279
11.1	Saturated Diamondoid Oligomers	279
11.2	Unsaturated Oligomers	287
	References	293
12	Doped Diamondoids	305
12.1	@-Doping	306
12.2	Internal Doping	308

12.3	External Doping	318
	References	329
13	Perspective	339
	References	340
	Index	343