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