

# Contents

List of Contributors	v
Preface	xiii

## I Mesoscopic Materials

### I -A Mesoscopic Particles Embedded in Matrix and Some Porous Materials

1. Effects of Manybody Interaction on the Properties of Mesoscopic Particles	1
2. Nonlinear Optical Responses of Frenkel Excitons	9
3. Optical Properties and Structural Changes in Semiconductor Fine Particles	19
4. Fundamental and Nonlinear Optical Properties of Semiconductor Mesoscopic Particles	31
5. Nonlinear Coherent Phenomena in Semiconductor Nanocrystals Embedded in Glass	47
6. Atomic Bonding and Excitons in Ultrathin PbI <sub>2</sub> Crystallites	57
7. Optical Properties of Mesoscopic Particles Prepared by Sputtering Method	73
8. Mesoparticle Buried in Semiconductor	83
9. FIR Spectroscopy of Fine Particles under High Pressure	93
10. Nanostructure Semimagnetic Semiconductors	101
11. Kubo Effects in Small Particles of Metals	113
12. Growth of Crystalline Composite Films of Au-MoS <sub>2</sub> and CaF <sub>2</sub> -MgO	123
13. Growth of Au-Cu Alloy Particles on and in MgO Films	129

### I -B Reaction and Coated Materials

14. <i>In situ</i> Observation of Spontaneous Alloying in Nanometer-Sized Atom Clusters	131
15. Cluster-Cluster Aggregation of Calcium Carbonate at the Air/Water Interface	145
16. Electronic State of Ultrafine Particles Suspended in Liquid Media	153
17. Electron Correlation within Fine Particles and Quantum Dots	167

18. Synthesis and Optical Properties of Coated Composite Nanoparticles 187
19. Structure and Physical Properties of Chalcogen Microclusters 205
20. Synthesis and Photophysical Properties of III–V Semiconductor Nanocrystals 211
21. Absorption and Photoemission Studies of Au-55 Metal Clusters 223
22. Stability of Spin-glass Ordering in the Nanoparticle System 229

## II Clusters

### II -A Properties in Vacuum

23. Screening Effects in Metal Clusters 239
24. Electronic States of Transition Metal Clusters 249
25. SIMS Experiment 259
26. Preparation of Nanometer-sized Composite Particles by Flowing Gas Evaporation Technique 275
27. Tungsten and Chromium Having the A15-Structure 285
28. Dynamic Properties of Cluster Ions in Relation to the Geometric and Electronic Structures 295
29. Structure and Reactivity of Binary Clusters 303
30. Formation and Application of High Intensity Cluster Beams 311
31. Cluster Ions Emitted from a Liquid Metal Ion Source 321
32. Neutron Irradiation of Carbon Nanoparticles 329
33. Size-dependent Characteristics of Single-wall Carbon Nanotubes 333
34. Laser-plasma Soft X-Ray Absorption Spectroscopy of Laser-ablated Silicon and Graphite Particles 337
35. Optical Study of Free Clusters and Microcrystals by Time- and Space-resolved Spectroscopy Combined with Gas Evaporation Method 347
36. Electronic Structures of Graphitic Carbon Cage Structures 357
37. *Ab initio* Investigation of Metal-doped B<sub>12</sub> Solids 365
38. Structure and Stability of Large Carbon Clusters 379
39. Carbon Clusters and Carbon Composite Particles 389
40. ESR Studies on Endohedral Metallofullerenes 397

### II -B Properties Held on Surfaces

41. Development of a Scanning Atom Probe 407
42. STM/STS Study of Semiconductor Clusters 419
43. Structure and Physical Properties of Atomic Clusters in MgO Crystals 429
44. Vibrational Modes and Structure of C<sub>60</sub> on Si(111)7 × 7 and Graphite Surfaces—Study by HREELS-STM 443