

Contents

1	Interaction Between Atoms in the Substance	1
1.1	Van der Waals Forces	2
1.2	Quantum Mechanical Description of Atom Interactions	5
1.3	Strong Chemical Bonds	10
1.3.1	Ion Bonds	10
1.3.2	Covalent Bonds	12
1.3.3	Metallic Bonds	13
1.3.4	Hydrogen and Resonance Bonds	14
1.4	Collective Interaction Between Atoms	15
1.5	Crystallization	20
1.6	Crystalline Structure	23
1.7	Electronic Structure of Materials	29
1.8	Interaction Between Molecular Chains	33
	References	35
2	Crystalline Materials: Surfaces of Solid Bodies	37
2.1	Defects of Crystalline Structure	38
2.2	Polycrystals	48
2.3	Solid Body Surface	51
2.4	Phase Boundaries	62
	References	65
3	Dynamic Microprocesses in Solid Bodies	67
3.1	Elastic Waves in Crystals	67
3.2	Quantum Crystalline Lattice Oscillations	72
3.3	Diffusion in Crystals	74
3.4	Motions of Dislocations	83
3.5	Dependence of the Crystalline Lattice Parameters on Dynamic Factors	90
	References	93

4	Friction Microdynamics	95
4.1	Friction Effect on Solid Body Surface	95
4.2	Diffusive Triboprocesses in Friction	101
4.3	Motion of Dislocations in Friction	111
4.4	Relativistic Effects in Friction	116
	References	125
5	Plasma Triboprocesses	127
5.1	Mechanoactivation of Surfaces of Tribocouples	127
5.2	Triboplasma	130
5.3	Wave Processes in Triboplasma	146
5.4	Effect of External Electromagnetic Fields on Triboplasma	150
5.5	The Experimental Methods of Triboplasma Study	155
	References	162
6	Wave Tribochemistry of Post-Plasma States	165
6.1	Interaction Between Triboplasma with Tribosurface	166
6.2	Post-Plasmatic States and Wave Processes Due Tribochemical Synthesis	170
6.3	Apparatus of Wave Mechanics for Description of Tribocouple Micromechanics	176
	References	183
7	Antifriction Micromechanisms	185
7.1	Lubricating Layer Formation	186
7.2	Chemical Interaction in Friction	190
7.3	Complex Compound of Tribomaterials	192
7.4	Tribocoordination or Surfing Effect	201
7.5	Additives Based on Complex Compounds	209
	References	211
	Afterword	213
	Index	215

Micromechanisms of Friction and Wear

Introduction to Relativistic Tribology

Lyubimov, D.; Dolgoplov, K.; Pinchuk, L.

2013, X, 219 p. 102 illus., 4 illus. in color., Hardcover

ISBN: 978-3-642-35147-1