**Index**

**A**
- Alumina 1
  - Chemical reactions 19, 20
  - Color 22, 23, 24
  - Creep 10
  - Density 11, 12
  - Dielectric properties 17
  - Diffusion in 17, 18
  - Elasticity 7
  - Electrical conductivity 14, 15, 16
  - Fatigue 9
  - Fracture toughness 11
  - Hardness 9
  - Hydrated 5
  - Optical absorption 21, 22, 23
  - Phase diagrams 6, 7, 31, 32, 33, 51, 56, 59, 61
  - Plastic deformation 10
  - Processing 2, 3
  - Refractive index 21, 22, 23
  - Specific heat 12
  - Strength 8
  - Structures 3, 5
  - Thermal conductivity 13, 14
  - Thermal expansion 11, 12
  - Uses 1, 2
  - Vaporization 13
- Alumina–silica
  - Chemical decomposition 44
  - Phase diagrams 6, 7, 31, 32, 33, 42
- Aluminates 49
  - Properties 50
- Andalusite 41
  - Pressure–temperature phase diagram 42
  - Structure 43
- Atomic bonds 95–97

**B**
- Bauxite 2
- Bayerite 5
- Bayer process 3
- Bentonite 123
- Bioceramics
  - Calcium aluminate 53
  - Boehmite 5

**C**
- Calcium aluminate 49, 51
  - Glasses 54
  - Phase diagram 51
  - Processing 53
- Cements
  - Calcium aluminate 51
  - Portland 137, 138
- Clays 113
  - Applications 133
  - China clay 120, 121
  - Classifications 119
  - Cost 114
  - Deposits 120
  - Forming 127–130
  - History 113
  - Processing 125
  - Production 114
  - Structures 115–118
  - Water in 126, 131
- Coesite 75
- Concrete 137–139
  - Applications 142
  - Castables 146, 147
  - Evaluation 142, 147
  - Fiber reinforcement 139–141
  - Impact-echo testing 142
Concrete (cont.)
  Research on 144
  Strength 142
Corundum 3. See also Alumina
Cristobalite 79
  Structure 80
Crystal structure 97–99

D
Density
  Aluminas 11, 12
  Various ceramics 84
Diaspore 5
Diffusion in
  Alumina 17, 18
  Mullite 37
  Zirconia 189–191

E
Extrusion 129

F
Feldspars 119
Fire clay 90, 122

G
Gibbsite 5
Glasses
  Calcium aluminate 54
  Lead Silicates 158, 160
  Refractive index 159
  Silica 79, 81, 83, 84
  Viscosity 159
  Yttrium aluminate 64

K
Kaolinite 32, 117, 119
  Formation mechanism 118
Kyanite 41, 90
  Pressure–temperature phase diagram 42
  Structure 43

L
Lead compounds 153
  Applications 157
  Health effects 164–166
  In Glass 157–160
  Lead minerals 155, 156, 161
  Physical properties 156
  Processing 161–164
  PZT 161
  Regulatory limits 166
  Thermodynamic properties 157
Lithium aluminate 58
  Phase diagram 59
  Processing 60
Lucalox™ 4

M
Magnesium aluminate 55
  Phase diagram 56
  Processing 57
Mechanical properties 108
  Alloys 154
  Alumina 7–11
  Mullite 37
  Polymers 154
  Quartz 84
  Silica glass 82
  Various ceramics 84, 100, 108
  Zirconia 182–186
Melting temperatures of
  Oxides 92, 93, 100, 105
Metakaolin 131
Mica 117
Mullite 27
  Defects 29
  Diffusion in 37
  Formation (chemical) 44, 132
  Fracture toughness 37
  Hardness 37
  Ionic conductivity 37
  Microstructure 35, 103, 104
  Phase diagram 31, 32, 33
  Processing 32–36
  Pseudo 33
  Strength 37
  Structure 28, 29, 43
  Thermal expansion 36
  Transparent 36

P
Porosity 4
Pressing 127
Pyrophyllite 117, 119

Q
Quartz 73, 76, 77. See also Silica
  Properties 84

R
Refractories 89
  Applications 94, 145
  Compositions 145
  Concretes 144
Index

Drying 146
Evaluation 147
Firing 146
Oxides 89
Research 148
Ruby 22

S
Sapphire 24. See also Alumina
Silica 73, 90
  Glass (vitreous) 79–84
  Phase diagram 75
  Polymorphs 76
  Refractories 91
  Structures 75, 77, 78
Silica–alumina. See Alumina–silica
Sillimanite 41
  Deposits 46
  Pressure–temperature phase diagram 42
  Structure 28, 43
  Uses 47
Sintering 102–105
Slip Casting 129
Sol–gel processing 34
Spinel 132
Stishovite 76

T
Talc 124
Thermal conductivity 107
  Alumina 13, 14
  Tridymite 75, 76

V
Viscosity
  Glasses 159

Y
Yttrium aluminate 60
  Glass 63
  Phase diagram 61
  Processing 63
  Structure 62

Z
Zirconia 171
  Allotropic phases 172, 191–195
  Amorphous 179
  Creep 185–186
  Cubic 174
  Diffusion in 189–191
  Elasticity 182
  Electrical conductivity 186–189
  Hardness 183
  High pressure phases 177, 178
  Martensitic transformations 192
  Monoclinic 176
  Phase diagrams 192, 194
  Point defects 180–182
  Stabilized 172, 193
  Tetragonal 175
  Toughness 183–185