

Index

Note: page references in **bold** refer to main sections.

- Absorption edge 359
Acceptor dopant 495
Acid-base cement 760
Activation energies for ionic conduction **504, 817**
Activator 593
Admittance 625
Aerosol synthesis **257**
AgCl, ionic conductivity **509**
Ag⁺ ion conductors **509**
AgI **522**
Ag₂O, AgO, Ag₂O₃, Ag₃O₄ 788
AlB₂ 95
Albite 96
AlCl₃ 181
AlF₃ 181
Alite 745
Aliovalent dopant 135
Alkali activation 755
Alkali halides
 ionic conduction, **503**
Alkoxide sol-gel synthesis **230**
Almandine 92
Al₂O₃ 776
Alternating axis 11
β-alumina 513, 466, 768
Alumina refractories 766
Aluminium pH cycle 233
Aluminous cement 757
Amorphous silicon 251
Anatase 663
Andradite 92
Angell 717, 732
Anion conductors 523
Anorthite 96, 739
Anti-CdCl₂ structure 772
Antiferroelectric 556
Antiferromagnetism 564
Antifluorite structure 42, 772
Antiphase domain 146
Antiperovskite 74, 531
Anti-Stokes phosphor 597
Apatite 528, 594, 740
Arrhenius equation 125, 454, 815
As₂O₃, As₂O₅ 777
Astigmatism 342
Atomic layer
 deposition, ALD, **257**
 epitaxy, ALE, 257
Atomic scattering factor **285**
Au₂O₃, Au₂O 781
Auger spectroscopy **336**
Aurivillius phases **91**
Austenite 404
Autoclaved products 757
Avrami equation 458

- BaM 582
 Band gaps, tables 216, 494
 Band structure
 inorganic solids **215**
 of insulators 214
 of metals 213
 of Si **214**
 Band theory **207**
 BaO 45, 777
 BaCeO₃ 532
 BaRuO₃ **66**
 Basal plane, hexagonal cell 27
 BaTiO₃ **64**, 143, 418, 560
 BCS theory 476
 Becke line 328, 606
 Bednorz and Müller 140, 476
 Beer-Lambert Law 352
 Belite 745
 Benitoite 98
 BeO 52, 777
 Beryl 98
 Biaxial 328
 BiCUVOX 524
 BiFeO₃ **588**
 Binary phase diagrams **393**
 Biomaterials 742
 Bioglass 740
 Bi₂O₃ 527, 778
 Bixbyite structure 610
 Black body radiation 589
 Black phosphorus 692
 Black rutile 667
 Blue lasers and LEDs 689
 BN **692**, 765
 B₂O₃, B₆O 778
 Bode plot 625
 Body centred lattice 18
 Bohr magneton 356
 Bohr radius 612
 Bond valence-bond length correlation **187**
 Bonding and antibonding orbitals **198**
 Bogue calculation 745
 Borate glasses 709
 Borderline radius ratio **171**
 Born repulsive force 174
 Born–Haber cycle **176**, 192
 Born–Mayer equation 175
 Boron oxide anomaly 709
 Br oxides 778
 Bragg's law **275**
 Bridging oxygens 96, 751
 Bravais lattice **18**
 Brickwork model 634
 Bridgman method **261**
 Bright field imaging 334
 Brillouin zone 213, 617
 Brookite 663
 Brownmillerite **66**
 Buerger's classification **440**
 Bulk properties 619
 Burger's vector 149
 Burstein-Moss effect 613

 C₆₀ **38**
 C₇₀ **39**
 Ca₃Al₂O₆ 749
 Ca₁₂Al₁₄O₃₃ 527, **680**, 757
 CaAl₂Si₂O₈ 739
 CaCu₃Ti₄O₁₂ **65**
 Cadmium chloride structure **55**
 Cadmium iodide structure **55**
 Caesium chloride structure **54**
 Caesium oxide structure **55**
 Calcium aluminates 747
 Calcium silicates 747
 Ca(OH)₂ structure 750
 CaO 45, 779
 Ca-stabilised zirconia **141**
 Capacitance values 637
 Carborundum 769
 Carbothermal reduction 228
 CaMgSi₂O₆ 739
 CaSiO₃ 739
 Ca₂SiO₄ 748
 Ca₃SiO₈ 747, 754
 Cathodoluminescence **339**, 592
 C, diamond **48**
 CdO 45, 778
 Cement and concrete 405, 681, **743**
 Cementite 404
 Centre of symmetry **14**, **106**
 CeO₂, CeO₂ 47, 526, 779
 Ceramic steel 768
 Ceramic superconductors 476
 Chalcogenide glass **721**
 Characterisation of solids, 267

- Charge transfer resistance 640
- Chemical machining 740
- Chemical potential 649
- Chemical shift, Mossbaur 368
- Chemical shift, NMR 353
- CVD **250**
- Chevrel phases 482
- Chimie douce **230**
- Chlorine oxides 779
- Chromatic aberration 342
- Chrome-magnesia refractories 766
- Chrysoberyl, Al_2BeO_4 84
- Citrate gel method 235
- Clathrate 681
- Clausius-Clapeyron equation 450
- Clausius-Mossotti 550
- Clay mineral 98
- Clinker 744
- Close packed structures 25, **31**
- CO , CO_2 779
- Coercive field 571
- Coesite 388
- Coherent interface 223
- Coherent scattering 285
- Cole-Cole plot 625
- Colloid chemistry 232
- Colossal magnetoresistance **586**
- Colossal permittivity 644, 677
- Colour centre **126**
- Combustion synthesis **228**
- Commercial glasses 728
- Compensation temperature 581
- Composition, definition of 390
- Compton scattering 286
- Condensed phase rule **381**
- Conditional glass former 698
- Conduction band 214
- Configurational coordinate model **594**
- Configurational entropy, 119
- Congruent melting **393**
- Consolute temperature 712
- Constant phase element, CPE 623, **631**
- Controlled valency semiconductor 499
- CoO , Co_2O_3 , Co_3O_4 45, 780
- Cooper pair 476
- Coordinated polymeric structures **184**
- Coordination number 25
- Copper ion conductors **521**
- Cordierite 739, **767**
- Core-shell structure 636
- Coring 396
- Corundum structure **85**
- Coulomb's law **166**, 172
- Covalent bonding, network structure **37, 196**
- Covalent radii **181**
- CrCl_3 structure 34
- Cristobalite 388
- Critical resolved shear stress 155
- Critical size of nuclei 455
- Cr_2O_3 , CrO_3 , CrO_2 , CrO 58, 779
- Crystal densities **23, 28**
- Crystal field splitting **188**
- Crystal monochromator **279**
- Crystal field stabilisation energy 178, 195
- Crystal system 1
- Crystallographic point groups **812**
- Crystallographic shear structure **143**, 784
- CsCl structure **54**
- Cs_2O structure 49, 60, 778
- Cs suboxides 778
- CuAlO_2 structure 617
- Cubic unit cell, symmetry 9, 16
- Cubic close packing **25, 27**
- Cu^+ ion conductors **521**
- CuO , Cu_2O , Cu_4O_3 55, 780
- Cuprite **48**
- Cuprate superconductors **484**
- Curie law **566**
- Curie temperature 143, 555
- Curie-Weiss law **555, 566**
- Current overload protection 685
- Czochralski method **261**
- Dark field imaging 334
- Debye Falkenhagen effect 533, 634
- Debye-Hückel ion atmosphere 533
- Debye-like circuit element 623
- Debye peak 626
 - temperature 657
- Debye-Scherrer camera 276
- Defect aggregates or clusters **128**
- Delafossite structure 617
- Density measurement **140**
- Density of states 211
- Depletion region 501, **638**
- Devitrification of glass 705

- Diamagnetism **368, 563**
 Diamond structure **48**
 Diamond films **251**
 Dielectric constant 621
 Dielectric loss 642, 677
 Dielectric materials, 470, **547**
 Dielectric relaxation 642
 Dielectric spectroscopy 624
 Difference Fourier map 300
 Differential scanning calorimetry, DSC **371, 413**
 Differential thermal analysis, DTA **371, 413**
 Diffraction
 of electrons **317**
 of light, 272, 592
 order 274
 of neutrons **302**
 techniques **325**
 of X-rays 274
 Dihedral angle 762
 Dilatometry 445
 Dilute magnetic semiconductor DMS 676
 Dion-Jacobsen phases **91**
 Diopside 596, 739
 Direct methods **300**
 Dislocations 120, **147**
 Dislocation loop **151**
 Displacive phase transition 440
 Donor doping **495**
 Doppler effect 367
 Double layer capacitance 640
 Dreierkette 752
 Drift velocity 496
 Dulong and Petit 656
 Dy₂O₃ 780
 Dysprosium iron garnet 581

 EBIC 334
 EDAX 272, **336**
 Eddy current 571
 Edge dislocation **148**
 Effective electron mass 497
 Effective nuclear charge **182**
 Elastic deformation 154
 Electric modulus 625
 Electrical microstructure 620
 Electride 680, **684**
 Electroceramics **619**
 Electrochromism **545, 615**

 Electrode potentials **819**
 Electroluminescence 592
 Electrolytic domain 526
 Electromagnetic lens 333
 Electromagnetic spectrum **268, 346, 589**
d-Electron effects **188**
 Electron density contour map 163, **299, 301**
 Electronegativity equalization, principle 183
 Electron
 diffraction **301, 317**
 microscopy, SEM, TEM, HREM, EDX **330**
 energy loss spectroscopy, EELS **342**
 electron nuclear double resonance,
 ENDOR 302
 paramagnetic (spin) resonance **356**
 probe microanalysis, EPMA **332, 336**
 spectroscopies, Auger, ESCA, XPS, AES,
 EELS **363**
 Electrostatic bond strength 167
 valence rule 166
 Elements, bond lengths to oxygen **801**
 electronic configurations of **801**
 oxidation states **801**
 structural data **801**
 Elliptical polarisation 589
 Energy dispersive analysis, EDX **336**
 Energy management of buildings **610**
 Enstatite 739
 Enthalpy of association of defects 506
 Entropy, 119
 Entropy of fusion 512
 Epitaxy **222**
 EPMA 336
 Equivalent circuits **645**
 Equivalent positions 31, 100
 Er₂O₃ 780
 ESCA **363**
 ESR spectroscopy **356**
 Ettringite 753
 Eu₂O₃, EuO, Eu₃O₄ 781
 Eucryptite 96
 Eutactic structures 27, 32
 Eutectic **389**
 Eutectoid **400**
 Ewald sphere **314, 565**
 EXAFS **338**
 Extended defect, 121, **143**
 Extrinsic defect **120**

- Face centred lattice, 18, 27
- Fast ion conductor **502**
- F-centre, 126
- FeO, Fe₂O₃, Fe₃O₄ 45, 55, 782
- Fermi level and energy 209, 687
- Ferrielectric 557
- Ferrimagnetism 564
- Ferrite 745, 783
- Ferroelastic 588
- Ferroelectric 471, **553**
- Ferromagnetism **564**
- Fert and Grünberg 586
- Fibre optics **606**, 736
- Fictive temperature 701
- Fireclay ceramics 766
- First order transition, 444
- Fivefold symmetry 11
- Floppy disc 585
- Fluorapatite 596
- Fluorescence 272
- Fluorescent lamp 593
- Fluoride ion conductors **523**
- Fluoride glass 733
- Fluorite structure **42, 88**
- Flux 763
- Flux pinning 480
- Fly ash 756
- Form factor **285**
- Forsterite 84, 739, **767**
- Fourfold inversion axis 14
- Fourier methods **300**
- Fractional atomic coordinates **24, 30, 36**
- Fractional crystallisation **396**
- Fragility of glass 717
- Free energy 119, 534
- Free electron theory 209
- Freezing point depression **392**
- Frenkel defect 121
- Fulcher equation 716
- Fullerene, fulleride **38, 218, 491**
- Functional materials 619, **663**

- GaAs 45
- Gandolfi technique **284**
- Ga₂O₃ 781
- Garnets **90, 580, 783**
- Gas sensor 225, **545**, 676
- Gd₂O₃ 781
- GdFeO₃ **69**
- Gehlenite 758
- General positions **105**
- Generation of X-rays **269**
- GeO₂ 58, 781
- Geometry of polyhedra **801**
- Geopolymer 755
- Giant magnetoresistance **586**
- Giant permittivity 644, 677
- Gibbs, WJ 381
- Gibbsite 758
- Glaserite structure 749
- Glass 407, **697**
- Glass-ceramics **737**
- Glass forming oxides 698
- Glass ionomer cement 760
- Glass transition temperature 541, 700
- Glazer notation 64
- Glide plane **16**
- Goldschmidt radii 164
- Goodenough 536
- Graphene **243, 692**
- Graphite **218**
 - fluoride 241
 - intercalation compounds **241**
 - refractory 769
- Gratzel cell **672**
- Griffiths flaw 727
- Grossular 92
- Grotthus mechanism 532
- Guinier (focusing) method 277
- Gypsum 743
- Gyromagnetic ratio 568

- HAADF **343**
- Half-reaction 820
- Hard magnetic materials 572
- Haven ratio 510
- Heat capacity **656**
- Heart pacemaker 536
- Heavy fermion compound 482
- Helimagnetism 564
- Hermann-Mauguin system 11
- Heterogeneous materials **619**
- Heterogeneous nucleation 222
- Hexagonal close packing **25**
- Hexagonal perovskite **69, 74**
- Hexagonal unit cell, symmetry **9, 16**

- HfO_2 781
 HgO , Hg_2O 181, 784
 High alumina cement 757
 High pressure methods **259**
 High T_c cuprate superconductors 91, **484**
 Ho_2O_3 780
 Hollandite **519**
 Homogeneous materials 619
 Hopping semiconductor 499
 Hund's rule of maximum multiplicity 188
 $\text{H}_2\text{UO}_2\text{PO}_4 \cdot 4\text{H}_2\text{O}$, HUP 532
 Hybrid perovskites **73**
 Hybridisation **201**
 Hydration of cement 752
 Hydraulic cement 753
 Hydrogen bonds 162
 Hydrothermal synthesis **237**
 Hysteresis loop, 571
 loss 571

 Ice 387
 III-V compounds 46
 Ilmenite structure **85, 581**
 Immiscibility dome, 398
 Impedance measurements **644**
 Impedance spectroscopy **619**
 Incoherent light 591
 Incongruent melting **394**
 Indices of directions **22**
 Indifferent point 397
 Indirect band gap 602
 Indium tin oxide **610**
 Inelastic scattering **305**
 Inert gas compounds **178**
 Inert pair effect **196**
 Information storage **584**
 In_2O_3 782
 Intercalation **541**
 International Tables for X-ray
 Crystallography 111
 Interplanar spacings **795**
 Interstitial
 conduction **509**
 solid solution **131**
 Interstitialcy mechanism 509
 Intrinsic defect **120**
 semiconductivity 492
 Invariant point 386
 Inverse opal 616

 Inverse spinel **81**
 Inversion axis **14**
 Iodine oxides 782
 Iodometry 490
 Ion
 atmosphere 634
 exchange 727
 hopping frequency 533
 mobility 817
 Ionic bonding **162**
 conductivity **502, 640**
 radii **126, 162**
 structures **32, 166**
 Ionicity 161
 Ir_2O_3 , IrO_2 58, 782
 IR and Raman spectroscopy **346**
 IR transmitting windows 254
 Isoelectric point 99
 Isothermal section 423
 ITO **610**
 IUPAC convention 819

 Jahn-Teller effect **191**
 Jonscher power law **631, 633**
 Josephson junction 492
 Joule heating 648
 Junction magnetoresistance 587

 k-space 617
 Kagome network 90
 Kalsilite 96
 Kaolinite **97, 766**
 Kapustinskii equation **175**
 Kauzmann Paradox 717
 Keggin ion 242
 Kelvin relation 653
 Kerr effect 585
 KH_2PO_4 443
 Kirkendall effect 225
 K_2NiF_4 structure **91**
 K_2O , K_2O_2 , KO_2 , KO_3 47, 786
 Koch cluster 129
 Kroger-Vink notation **122**
 Kronig fine structure 362

 Lambda transition 449
 $\text{La}_2\text{Ni}_2\text{O}_5$ **66**
 Lanthanide contraction 162
 La_2O_3 783

- Laser Raman spectroscopy **346**
 Lasers 589, **598**
 Lattice **18**
 energy **172**, 192
 imaging 145
 plane **20**
 Laue equations **274**
 Law of mass action 123
 Layered cuprate superconductors **91**
 double hydroxides **242**
 Leaky capacitor 624
 Le Chatelier's principle 387
 LED **602**
 Lever rule **391**
 Levitation 479
 LiCoO₂ **138**, **542**
 LiFePO₄ 83, 543
 LiFeO₂ 443
 Li₄GeO₄ 528
 Light emitting diode **602**
 Lightning protection 685
 Li/I₂ cell 536
 LiMn₂O₄ 138
 Li₃N 528
 LiNbO₃ **85**
 Line defect 120
 Li₂O, Li₂O₂ 47, 783
 Li₂NiMn₃O₈ 528
 Liquid immiscibility **710**
 Liquidus **390**
 LISICON 528
 Li₄SiO₄ **528**
 Li₂Si₂O₅ 739
 Li₂SO₄ 528
 Lithiophyllite 84
 Lithium air batteries **544**
 anodes **537**
 batteries **536**
 cathodes **541**
 electrolytes **541**
 ion conductors **528**
 sulphur batteries **544**
 Li₁₄ZnGe₄O₁₆ 528
 Li₂ZnSiO₄ 528, 738
 Local electroneutrality 166
 London penetration depth 478
 Lone pair effect 774
 Lorentz number 659
 Low angle grain boundary 159
 Lowenstein's Al avoidance rule 756
 Lu₂O₃, LuO 783
 Luminescence 589, **592**

 Madelung constant **173**
 Magic angle spinning NMR 352
 Magneli phases 791
 Magnetic
 bubble memory device 585
 information storage **584**
 materials **572**
 moment **567**
 properties **563**
 recording density 584
 structure analysis 304
 susceptibility 564
 Magnetite 577
 Magnetocrystalline anisotropy 572
 Magnetoplumbite 519, **582**
 Magnetoresistance **586**
 Magnetostriction 572
 Martensitic transformation 404, **464**, 768
 Matthiesen's rule 471
 Mayenite 680
 MAX phases 690
 MDF cement **759**
 Mechanical properties **147**
 Mechanosynthesis **229**
 Meissner effect **368**, **478**
 Memristance 679, 725
 Memristor **678**
 MEMS 283
 Merzhanov 228
 Metakaolin 756
 Metal structures, table **32**
 Metallic bonding **207**
 conductivity **471**
 glass 730
 Metallurgical microscope 330
 Metamagnetism 575
 Metastable state 384
 MgAl₂O₄, **79**
 MgB₂ superconductor **95**, 482
 MgFe₂O₄ 577
 MgO 45, 765, 784
 MgSiO₃ 739
 Mg₂SiO₄ 739

- Microcrystallite model 706
- Microporous solids 234
- Microscopic techniques **325**
- Microstructure 761
- Microwave dielectric 550
 - synthesis **238**
- Miller indices, lattice planes, directions **20, 22**
- Mirror plane, symmetry **14**
- Mixed
 - alkali effect 518, **718**
 - conductor **532**
 - valency semiconductor 499
- MLCC 559
- MnFe₂O₄ 578
- MnO, Mn₃O₄, Mn₂O₃, MnO₂, Mn₂O₇ 45, 58, 305, 784
- MOCVD 251
- Molar refractivity 730
- Molecular orbital **198**
- Molten salt synthesis **246**
- Molybdenum bronze **77**
- Mond process 249
- Monoclinic unit cell, symmetry **9, 16**
- Monosulphate 753
- Monticellite, CaMgSiO₄, 84
- Montmorillonite **97**
- MoO₂, MoO₃, MoO_{3-x} 58, 784
- Mooser-Pearson plots and ionicities **185**
- MoS₂ 694
- MoSi₂ 769
- Moseley's law **269**
- Mössbauer spectroscopy **367**
- Mott transition 612
- Multiferroic **587**
- Multiplicity 109, 295
- Muscovite 97
- Mxenes **689**

- Na β -alumina **193, 514**
- NaCl, ionic conductivity **506**
- NaCl structure **42**
- Nanostructure 266
- Na₂O, Na₂O₂, NaO₂ 47, 788
- Nasicon **519**
- Na_xWO₃ **77**
- NaZr₂(PO₄)₃ 520
- Nb₃Ge 476
- Nb₂O₅, NbO₂, NbO 58, 784

- Nb₃Sn 476
- Nd₂O₃ 784
- Nd₂Fe₁₄B 575
- Neél temperature 566
- Negative temperature coefficient of resistance 560
- Negative thermal expansion 661
- Neodymium laser **601**
- Nernst-Einstein equation, 509
- Nernst equation 545
- Network-forming oxides 709
- Neutron diffraction **302**
- NH₄Cl 467
- NH₄CN structure **55**
- NH₄H₂PO₄ 443, 558
- NiAs structure **49**
- NiO 45, 139, 149, 784
- Nitrogen oxides 784
- NMR **352, 709**
- Non-bridging oxygens 96, 707, 751
- Non-crystalline solid 697
- Non-polar covalent radii **181**
- Non-radiative energy transfer 596
- Non-stoichiometric defect **120**
- Normal spinel, 80
- NpO₂ 47
- n-type conduction **642**
- NTC thermistors 560
- Nuclear spin 352
- Nucleation and growth 455, **457**, 712, 739
- Numerical aperture 326
- Nyquist plot 625

- Obsidian 697
- Octahedral sites **33**
- Ohm's Law 625
- Olivine structure **83**
- One-component system **386**
- Opal 616
- Optic axis 327
- Optical basicity 730
 - grating 272
 - indicatrix 327
 - microscopy **326**
 - properties **589**
- Optoelectronics 688
- Order-disorder phenomena 32, **131, 466**
- Organic

- charge transfer complexes **474**
- metals **472**
- Orthogonal unit cell, axes 23
- Orthorhombic unit cell, symmetry **9, 16**
- Orthosilicate 748
- OsO₂, OsO₄ 58, 786
- Ovonic switching devices 727
- Oxide ion
 - conductors **524**
 - partial charge 183
 - semiconductor **498**
- Oxyfluorides **74**
- Oxynitrides 74
- Pair distribution function, PDF 319
- PaO, PaO₂, Pa₂O₅ 787
- Parallel
 - plate capacitor 548
 - RC element 621, **626**
- Paramagnetism 564
- Partial dislocation 157
- Patterson method **299**
- Pauli paramagnetism 576
- Pauling's electrostatic valence rule 167
 - electronegativities 183
 - ionic radii 164
- PbF₂ 524
- Pb(Mg,Nb)O₃ 553
- PbO, PbO₂, Pb₃O₄ 47, 55, 58, 196, 783
- PbTiO₃ 171
- Pb(Zr,Ti)O₃ 554, **558**
- PDF **319**
- PdO structure **55, 786**
- Pechini process **235**
- Peltier effect 648
- Penrose tiling 12
- Periclase 784
- Peritectic **394**
- Peritectoid **400**
- Permanent magnet **583**
- Permeability 564
- Permittivity (also, of free space) 547, 621, 677
- Perovskite structure **61, 115, 581**
- Petrographic microscope **327**
- PGEC 654
- Phase diagram
 - Al₂O₃-SiO₂ 764
 - Anorthite-albite
 - Be-Zr 732
 - Bi₂O₃-Fe₂O₃ 411
 - CaO-Al₂O₃ 759
 - CaO-Al₂O₃-Fe₂O₃ 748
 - CaO-Al₂O₃-SiO₂ 433, 746
 - CaO-SiO₂ 405
 - Fe-C 404
 - FeO-SiO₂ 764
 - Fe₃O₄-SiO₂ 764
 - H₂O 387
 - Li₂O-SiO₂ 408
 - MgO-SiO₂ 403
 - Mg₂SiO₄-Zn₂SiO₄ 399
 - Na₂B₈O₁₃-SiO₂ 729
 - Na₂O-CaO-SiO₂ 438
 - Na₂O-SiO₂ 407
 - Na-S 406
 - SiO₂ 387
 - Ti-TiO₂ 664
 - ZrO₂-Y₂O₃ 410
- Phase difference, delta 289
- Phase rule **381**
- Phase separation 710
- Phase transitions 305, **439**
- Phillips-van Vechten ionicities 186
- Phlogopite 98
- Phonon 469
- Phonon glass 654
- Phosphor materials 596
- Phosphorene 694
- Phosphorescence **593**
- Photocatalysis 674
- Photochromic glass 721, 740
- Photoconductivity 493
- Photocopy process 725
- Photodetector **604**
- Photoelectrolysis 671
- Photoemission 606
- Photoluminescence 602
- Photomultiplier 606
- Photonic crystals 616
- Photovoltaics **607**
- Piezoelectric 471, **558**
- Pillared clays **242**
- Plagioclase feldspar 96, 396
- Plane defect 121
- Plasma frequency 613

- Plasmon 613
 Plaster of Paris 743
 Plastic deformation and flow 154
 Plastic sulphur 722
 PMN 553
 Pm_2O_3 787
 p-n junction 474, 501, 603, 649
 P_2O_5 , P_2O_3 786
 Point defects **120**
 Point groups **99, 811**
 Point symmetry 11, **15, 99**
 Poisoning of phosphors 596
 Polar dielectric 551, 622
 Polarisability 547, 622
 Polarisation 547, 622
 Polarisation factor 286
 Polarising microscope **327**
 Polaron 684, 775
 Polyacetylene **472**
 Polyethylene 473
 Polymer electrolyte 541
 Polymorphism 382
 Polyparaphenylene **473**
 Polypyrrole **473**
 Polytypism 26, 769
 PoO_2 786
 Porcelain 766
 Portland cement **744, 754**
 Portlandite 743
 Positive temperature coefficient of resistance 560
 Powder X-ray diffraction **276**
 Pozzolan cement 743, 755
 Preferred orientation 280, 328
 Primary phase 390
 Priderite **519**
 Prince Rupert drops 717
 Principle of moments 392
 Pr_6O_{11} , PrO_2 , Pr_2O_3 47, 787
 Protonic conductivity **532**
 Pseudosymmetry 9, 17
 PTC thermistors 560
 PtO , PtO_2 , Pt_3O_4 55, 786
 p-type semiconductivity 492, **642**
 Pyrex glass 729
 Pyrochlore structure **85, 527**
 Pyroelectricity 471, **558**
 Pyrope 92
 Pyrophyllite 98
 Pyrosil 739
 Pyroxene 98
 PZT **557**

 Q switch 598
 Quadrupole splitting 369
 Quarter dislocation loop 151
 Quartz 97, 388
 crystal growth 237
 Quasicrystal **12**
 Q -value in silicates 352

 Radial distribution function, RDF 198
 Radius ratio rules **168**
 Raman spectroscopy **347**
 Rankinite 98
 Rare earth sesquioxides **85**
 Rayleigh scatter 347, 736
 γ -Ray spectroscopy 367
 RbAg_4I_5 522
 Rb_2O , Rb_2O_2 , RbO_2 , Rb suboxides 47, 787
 Reciprocal lattice **306**
 Reconstructive phase transitions **440**
 Reflected light microscope **330**
 Refractive index 730
 Refractories **761**
 Refractory concrete 757
 Relaxor ferroelectric 553, 622
 Relrod 318
 Remanence 571
 ReO_2 , ReO_3 , Re_2O_7 76, 144, 787
 Resolved shear stress 154
 R factor, X-ray **295**
 Rhenium trioxide structure **76**
 Rhombohedral 9, 16
 Rietveld refinement **295**
 Rochelle salt **553, 561**
 Rock salt structure **8, 42**
 Roller quenching 731
 Rotational symmetry **9**
 Ruby laser **599**
 Ruddlesden-Popper phases **91**
 RuO_2 , RuO_4 51, 58, 787
 Rutile, TiO_2 structure **55, 116, 167, 663**

 Saturation magnetization 571
 Sayre probability relationship 300
 Sb_2O_3 , Sb_2O_5 777

- Scattering factor 286
- Schönflies system 11
- Schottky barrier 638, 669, **687**
- Schottky defect **121**
- Sc₂O₃ 788
- Screw axis **15**
 - dislocation **150**
- Second order transition 445
- Secondary diffraction 319
- Seebeck effect 648
- Selected area electron diffraction **317**, 341
- Self-cleaning glass 674
- Self-diffusion 402
- Self propagating high temperature synthesis 228
- SEM **334**
- Semiconductivity **214, 492**
- Semiconductor laser **602**
- SeO₂, SeO₃ 788
- Series RC element 624, **628**
- Serpentine 767
- Sharp extinction 328
- SHS 228
- Si **409**
- Sialon **138, 768**
- SiC 765, 769
- Silica 452
 - polymorphism 388
- Silicate chemistry 749
- Silicate glasses 707
- Silicate structures **96, 749**
- Silicone 751
- Silver ion conductors **521**
- Si₃N₄ 765, 768
- Single source precursor 252
- Sintering 761
- SiO₂, SiO 387, 452, **788**
- Skull melting **263**
- Slagceram 739
- Slip, slip plane, slip step 149
- Smart window **545, 610**
- SmCo₅ 583
- SmO, Sm₂O₃ 788
- Snell's law 671
- SnO, SnO₂ 58, 791
- SO₂, SO₃ 788
- Sodium-sulphur cell 534
- SOFC 416, **546**
- Soft
 - magnetic materials 572
 - mode **305**
- Solar cells **607**, 674
- Sol-gel methods **230**
- Solid
 - electrolyte **502**
 - oxide fuel cell **546**
 - solution **131**
 - solution electrode 542
- Solid state
 - laser 599
 - metathesis 228
 - reaction **221**
- Solidus 390
- Solvothermal synthesis **237**
- Sonar 561
- Sorel cement **760**
- Space filling polyhedra **24, 39**
 - charge layer 501, **638**, 648
 - symmetry 11, **15**
 - groups **99, 107**
- d*-spacing and formulae **14**
- Special positions 105
- Spectroscopic techniques **345**
- Spessartine 92
- d-Spacing formulae **23**
- Sphalerite structure **42**
- Spherical aberration 341
- Spin
 - forbidden transition 598
 - glass behaviour 567
 - quantum number 568
- Spinels, magnetic properties **577**
- Spinel structure 79, 577
- Spinodal decomposition 385, 712
- Spintronics 677
- Splat quenching 731
- Split interstitial 128
- Spodumene 96, 739, 783
- Spontaneous
 - emission 590
 - nucleation 705
- Spray pyrolysis **257**
- Sputtering **255**
- Square planar coordination **193**
- SrO, SrO₂ 45, 788
- SrTiO₃ **115**
- Stacking fault **145**, 157

- Steatite ceramics 767
- STEM **341**
- Stereographic projection **100**
- Stimulated emission of light **598**
- Stishovite 388
- Stochasticity 706
- Stockbarger method **261**
- Stoichiometric defect **120**
- Stokes shift 593
- Stress birefringence 329
- Structural ceramics **761**
- Structure factor, X-ray **291**
- Structure amplitude 292
- Stuffed silica phases 137
- Subgrain boundary 146
- Substitutional solid solution **131**
- Sulphur glass and polymorphism 722
- Sunscreen applications 671
- Superconducting materials **481**
- Superconductivity 469, **476**
- Superexchange **570**
- Superionic conductor **502**
- Superhydrophilicity 674
- Superplasticiser 743
- Surge protection 686
- Symmetry **9**
- Synchrotron X-ray source **271**
- Synthesis methods **221**
- Systematic absences **310**

- Talc 98, 767
- Talcum powder 242
- Tan delta, δ 626
- Ta₂O₅ TaO₂, 55, 198, 790
- TbMnO₃ 588
- Tb₄O₇, Tb₂O₃ 790
- TCNQ 474
- TCO's **610**
- TcO₂, Tc₂O₇ 790
- Temperature factor, X-ray **294**
- TeO₂, TeO₃, Te₂O₅, Te₄O₉ 790
- Ternary system **413**
- Tetragonal unit cell, symmetry **9**, 16
- Tetragonal packing **57**
- Tetragonal tungsten bronze **76**
- Tetrahedral site **33**
- Thermal
 - analysis **370**
 - barrier coatings 637
 - conductivity **656**
 - expansion **656**
 - quenching 595
- Thermistor 502
- Thermite process 228
- Thermochemical radii 176
- Thermocouples **650**
- Thermodynamics 140, 712
 - of defect formation 119, **122**
- Thermoelectric
 - coefficients 652
 - effects 647
 - efficiency 655
 - power 653
 - series 652
- Thermogravimetry, TG **370**
- Thermomechanical analysis TMA 370
- Thermopile 653
- Thin films, preparation 250
- Thiolisicon 530
- ThO₂ 47, 790
- Thomson effect 647
- Thomson equation 286
- Thortveite 98
- Tilted perovskites 64
- Time-temperature-transformation, TTT,
 - diagrams 459
- Tm₂O₃ 791
- TMS 751
- Ti oxides 45, 791
- TiO₂ 55, 663, 791
- TiS₂ 240
- Tl₂O, Tl₂O₃ 790
- Tobermorite 750, 752
- Tolerance factor 63
- Topochemical reaction 222, 240
- Topotactic transition 461
- Topotaxy 222
- Total internal reflection 607
- Total scattering 319
- Transformation toughening 768
- Transformer core 583
- Transistor 502
- Transition metal
 - dichalcogenides **692**
 - oxides, magnetism **576**
- Transmission electron microscopy TEM **341**

- Transparent conductors 589, **610**
 Transporting agent 225
 Transport no. measurement **547**
 Triclinic unit cell, symmetry 9, 16
 Tridymite 388
 Trigonal unit cell, symmetry 9, 16
 Triphylite 84
 TTF 474
 Tungsten bronze **76**, 342, 545, 791
 Tunnelling magnetoresistance 587
 Twinning 13
 Two-component system **389**
 Two dimensional structures 689
 Twofold rotation axis 11
 Type I, II superconductors **480**
- Ubbelohde's scheme 448
 Unary system 384
 Uncertainty principle 197
 Uniaxial 328
 Unit cell 7, 16, 23, 30
 Unit cell volumes **795**
 UO_2 , U_3O_8 , U_4O_9 , UO_3 47, 76, 792
 Urbach edge 735
 Uvarovite 92
 UV spectroscopy **350**
- Valence bond theory **204**
 band 214
 Van Arkel method 248
 Van der Waals bonding 98, 162
 Vapour phase epitaxy, VPE 251
 Vapour phase transport **247**
 Varistors **685**
 Vogel-Fulcher-Tamman-Hesse equation 716
 Vegard's law 141
 Verneuil method 262
 Vibrational spectroscopy **346**
 Viscosity 698
 Visible and ultraviolet spectroscopy **350**
 VO , VO_2 , V_6O_{13} , V_2O_3 , V_2O_5 792
 VO_{2-x} 145
 Vortex lattice, pinning and state **480**
 Vycor glass 729
- Wadsley defect **144**
 Wavefunctions 197
 Warburg impedance 641
- Water-cement ratio 752
 Water splitting 671
 Weak electrolyte 720
 Weberite structure 88
 Weiss constant 566
 Whittingham 536
 Wien's constant 591
 Willemite 596
 WO_3 , WO_2 , Magneli phases 58, **143**, 545, 791
 Wollastonite 596, 739
 Work function 209, 606
 Work-hardening of metals 148, 152
 Wurtzite structure **49**, 772
 Wüstite 139, 383
 Wyckoff notation 109
- XeO_3 , XeO_4 792
 Xonotlite 355
 XPS **363**
 X-ray
 absorption techniques **360**
 diffraction **268**
 emission techniques **358**
 fingerprints **281**
 fluorescence, XRF **358**
 generation **269**
 intensities **285**
 line broadening **322**
 spectroscopies XRF, EXAFS, XANES **358**
 structure determination **296**
 systematic absences **117**, **287**, **310**
 wavelengths, table of 269
- YAG 90, 601
 Yao and Kummer 514
 $\text{YBa}_2\text{Cu}_3\text{O}_7$ **193**, **477**, **486**
 YIG 580
 Y_2O_3 793
 Yb_2O_3 793
 Yoshino 536
 YSZ **525**
- Zachariasen's rules **698**
 ZBLAN glass 724
 Z-Contrast STEM **343**
 Zebra cell **534**
 Zeeman splitting 353, 369

Zeolite **199**, **234**, 751

Zeta potential 99

Zinc blende structure **42**

Zirconia ceramics 767

ZnO **49**, 52, **685**, 793

ZnS phosphor 594

Zn₂SiO₄ 738

Zone refining **409**

ZrC 765

ZrO₂ 793

ZrO₂:Ca 137

ZrSiO₄ 768

