

Index

a

- ab initio* band structure 1101
- ab initio* calculations 265, 281, 363, 405, 931, 992, 1038, 1091, 1100, 1103
- ab initio* tight-binding methods 141, 214, 366
- ab initio* treatments 1089
- absorption, *see* photoreflectance spectra
- absorption, *see* reflectance 626
- accelerating energy 420
- acceptor 1000
 - substitutional 1007
- acceptor activation ratios 628
- acceptor concentration 1026
- acceptor-doped GaN 1018
- acceptor-like isotropic resonances 1002
- acceptor–nitrogen vacancy 936
- acoustic–acoustic interactions, *see* acoustic–optic interactions
- acoustic–optic interactions 56
- activation energy 581, 583, 657, 1025, 1044
- ADA complex formation 1026
- ADA model 1023, 1025, 1029
- adsorbate–surface interaction 411
- adsorption isotherm 390
- adsorption process 389, 391, 400, 405
- adsorption rate 412
- AFM stabilization energy 1100
- Al deposition 643
- AlInN
 - growth 695
- AlGaN
 - cracking 658
 - growth 653
 - low temperature interlayer 659
 - ordering 668
 - p-type growth 666
- AlGaN alloy 90
- AlGaN films 657
- AlGaN layers 90, 91, 245, 265, 483, 485, 546, 602, 653, 656, 658, 659, 664, 670, 672, 699, 1032, 1033
- AlInGaN-based heterostructures 99
- AlInGaN multiple quantum wells 100
- all-electron approach 136
- all-optical method 288
- Al mole fraction 654
- Al-rich conditions 651
- AlN
 - epitaxial relationship to Si (001) 383
 - growth 638
 - surface reconstruction 642
- AlN buffer layer(s) 381, 437, 446, 505, 631, 733
- AlN bulk crystals 176
- AlN electron effective mass 180
- AlN films 643
 - growth 409
 - molar fraction 276
- aluminum-based compounds 99
- aluminum mole fraction 655
- aluminum nitride 62
- aluminum nitride films 653
- ammonia incident kinetic energy 440
- ammonia-limited conditions 439
- amorphous GaN films 394
- amorphous material 1004
- anion–cation bond length 7
- anionic model potential parameters 141
- anisotropic energy 1167
 - splitting 159
- anisotropic growth 732
- anisotropic phenomenon 627
- anisotropy 1139, 1188
- annealing 643, 1018, 1035, 1178, 1189
- annealing, *see* LEEBI treatment
- annealing temperatures 1190

- annihilation radiation 991
- annular dark field imaging (ADF) 674
- anodic alumina membranes 737
- anodization parameters 504
- antibonding site 1036, 1037
- antiferromagnetic behavior 1157
- antiferromagnetic configuration 1089
- antiferromagnetic coupling 1143
- antiferromagnetic solids 1133
- antiferromagnetic state 1091
- antiferromagnetism 1137
- antisite defects 928, 934
- antisites–Ga 935
- antisites–N 935
- antistandard 498
- antisurfactant 721
 - microscopic mechanism 721
- a*-plane GaN 373, 376, 484, 604, 612, 616
- a*-plane sapphire 293, 351, 371, 375
- Archimedean displacement
 - measurements 78
- Arrhenius form 403
- Arrhenius plots 452, 581, 964
- Arrott plots 1074, 1129, 1131, 1164
- arsenide semiconductors 371, 596
- asymmetric reflections 605
- atmospheric pressure chemical vapor
 - deposition (APCVD) reactor 541
- atmospheric pressure two-flow system 721
- atom-centered basis functions 137
- atomic arrangement 545, 603
- atomic force microscopy (AFM) 550, 740, 832
 - image 340, 570
- atomic layer epitaxy (ALE) 79, 394, 528, 703
- atomic sphere approximation (ASA) 136
- Auger electron spectroscopy (AES) 69, 639, 341
- augmented plane wave (APW) method 135
- Austerman–Gehman model 846
- Avogadro’s number 440
- axial lattice parameter 7
- axial ratio 7
- azimuthal quantum number 1069

- b**
- backscattered electrons (BSE) 191
- ball-and-stick model 837
- band anticrossing (BAC) model 203
- band-edge emission 193
- band diagrams 1034
- band edge emission 604
- bandgap 100
 - bowing parameters 214, 205
 - issues 629
 - low-temperature(s) 172, 179
 - optical energy 627
 - semiconductors 55, 92, 956
 - variation 703
- band structure 132
- band tail model 170
- band-to-band model 1149
- band-to-band transitions 1161
- band wave functions 1114
- barrier–buffer interface 283
- barrier height 271
- basal GaN 373
- basal plane lattice parameter 7
- basal plane stacking faults 853
- basal sapphire plane 373
- basal-stacking fault 852
- Bastard’s formalism 213
- Bastard’s method 213
- BC position 1036
- beam equivalent pressure (BEP) 444, 993
- biaxial relaxation coefficients 158
- biaxial strain 226
- biaxial stress 484
- biexponential decay function 580
- biexponential fits 578
- biexponential PL decay curve 547
- binary alloys 1010
- binding energies 411
- binodal 698
- Bloch–Floquet theorem 133
- Bloch function 135
- Bloch wave 134
- Blombergen–Rowland interactions 1088
 - mechanism 1087
- blue band 1042, 1044
- blue luminescence (BL) 609
- blue-shifted emission 561
- blue–violet luminescence band 1045
- Bohr magneton 1167
- Bohr radius 213
- Boltzmann constant 54, 941, 403
- Boltzmann factor 956
- Boltzmann transport equation 968
- bond center (BC) 1016
- bonding energies 412
- bond rotation angle 368
- boron nitride (BN) 361
- Bose–Einstein expression 177
- boundary-limited transport 326
- bound magnetic polarons (BMPs) 1092
- bound sheet density 267
- bowing parameter 253, 269, 280
- Bragg diffraction 419
- Bragg mirrors 752

- Bragg's law 10, 463
 Bragg spots 456, 457
 Bragg-Williams approximation 390
 bright field (BF) TEM images 472, 473, 657
 Brillouin function 1126, 1139
 Brillouin scattering 37
 – measurements 63
 Brillouin-type magnetization 1054
 Brillouin zone 140, 1133, 1136
 – boundaries 135
 buffer layer(s) 94, 264
 built-in electric field 157
 built-in electrostatic fields 616
 bulk crystal growth 384
 bulk elastic coefficients 42
 bulk material properties 214
 bulk modulus 37, 38, 63
 bulk rods 426
 bulk SiC crystals 335
 burgers circuit 831
 burgers vector 289, 336, 473, 539, 571, 578, 614, 824, 823, 826, 832, 836, 837, 839, 843
 Burstein–Moss shift 194, 195
- C**
- cantilever epitaxy (CE) 558
 capacitance transient amplitude 946
 capture process 194
 carbon contamination 370, 396, 1041
 carbon nanotubes (CNT) 735
 carrier-ion direct-exchange 1084
 carrier-mediated ferromagnetic interaction 1141
 carrier–single magnetic ion interaction 1084
 cathodoluminescence (CL) 537, 558
 – data 177
 – images 471
 – spectra 1163
 cation–anion bond 844
 cation–anion distances 105
 cationic model potential parameters 141
 C–C bond strength 398
 Cd-doped GaN 1043
 cell internal parameter 105
 central processing unit (CPU) 140
 chalcopyrite-like (CH) structure 246, 254
 charge-coupled device (CCD) 425
 charge–spin coupling 1076
 chemical etching behavior 845
 chemical inertness 371
 chemical mechanisms 653
 chemical vapor deposition (CVD)
 furnace 751
 chemical vapor phase epitaxy technique 1015
 circular polarization 1110, 1116, 1117
 cladding layer thickness 584
c-lattice parameter 6, 7, 36, 494
 cleaving process 371
 CL emission bands 1056
 closed cycle cryostat 607
 closed-shell interaction 139
 coalescence boundaries 548
 coalescence interface 551
 coaxial heterostructures 755
 codoping method 1018
 coefficients of thermal expansion (CTE) 292, 483
 collision-free growth mode 431
 commercial LEC GaAs 331
 common-cation rule 192
 common-cation semiconductors 192
 compensation model 1025
 complexes 928
 – Ga-vacancy 936
 – H 937
 – N-vacancy 936
 compliant substrate 327, 328
 composition-dependent bowing parameter 95
 composition-induced reduction 211
 composition pulling effect 94
 composition, *see* bandgap 100
 conduction band 216, 1114, 1128
 conduction band Hamiltonian 1179
 conduction band minimum (CBM) 143, 208, 219, 871
 conduction band wave functions 147
 conductive AFM (CAFM) 621, 912
 confinement energy 220
 confocal micro-Raman scattering 637
 constant field approximation 288, 289
 constant pressure (C_p) 60
 continuum elastic theory 560
 conventional Czochralsky melt pulling method 359
 conventional semiconductor technology 465, 606
 convergent beam electron diffraction (CBED) 363, 472, 587, 819
 cooldown-induced thermal mismatch strain 260
 – effect 260
 corrugation maxima 644, 695
 – hexagonal array 644
 Coulomb exchange interaction 1084
 Coulomb gap 1162
 Coulombic defect 974
 Coulombic potential profiles 945

- Coulombic repulsion 591
 - Coulomb interaction(s) 987, 1123
 - Coulomb repulsion 982
 - Coulomb tail 931
 - covalent semiconductors 1038
 - coverage-dependent function 412
 - c*-plane sapphire 374
 - c*-plane strain 484
 - crack-assisted pendeo-epitaxy (CAPE) 547
 - cracked-ammonia flux 444
 - crack-free AlGa_N layers 659
 - crack-free samples 470
 - crack-free thick Ga_N 511
 - cross-sectional mapping 561
 - cross-sectional SEM image 530, 542, 626
 - Ga_N layers 556
 - SEM micrograph 546
 - cross-sectional TEM image 519, 551, 586, 620, 535, 668
 - cross-sectional transmission electron microscopy (XTEM) 486, 489, 631, 744
 - micrograph 543
 - observation 551, 662
 - crystal diffraction 418
 - crystal field 148, 1050
 - parameters 1149
 - splitting 148, 152, 1058, 1187
 - crystal-growth behavior 845
 - crystal-growth direction 1117
 - crystal-growth experiments 362
 - crystal-growth technique 323
 - crystalline Ga_N particles 723
 - crystalline grains 522
 - crystalline SiC 334
 - crystalline structure 514
 - crystallographic anisotropy 616
 - crystallographic directions 517
 - crystallographic orientation 531
 - crystallographic planes 529, 531
 - crystal-plane spacing 519
 - crystal symmetry 372
 - cubic crystal field 1061
 - cubic magnetocrystalline anisotropy 1184
 - cubic system 161
 - CuPt (CP) structure 246, 254
 - Curie temperature 1066, 1107, 1120, 1126, 1129, 1133, 1139, 1143, 1144, 1156, 1160, 1163, 1164, 1167, 1177, 1184, 1187
 - Curie–Weiss law 1126, 1160, 1073
 - Curie–Weiss-type temperature dependencies 1126, 1151
 - current–voltage characteristics 746
 - current–voltage measurements 575, 749
 - CVD-based catalytic 733
 - cyclotron measurements 169
 - Czochralski method 294, 332, 355, 358
- d**
- DAP transitions 1043
 - dashed curve 56
 - deBroglie wavelength 212
 - Debye expression 60
 - Debye length 264
 - Debye temperature 54, 55
 - Debye theory 79
 - decomposition 416
 - processes 400
 - deep-level carrier emission 939
 - deep-level defects 194, 1041
 - deep-level emission 193
 - deep-level impurities 205
 - deep-level optical spectroscopy (DLOS) 956, 1041
 - deep-level transient Fourier spectroscopy (DLTFS) 963
 - deep-level transient spectroscopic measurements 818
 - deep-level transient spectroscopy 938, 939, 581
 - defect(s)
 - affected by hydrogen 924
 - analysis by chemical etching 905
 - analysis by deep-level transient spectroscopy 938
 - analysis by surface probes 910
 - role of hydrogen 1004
 - V-type in InGa_N quantum well 905
 - V-type induced by Mg doping 894, 895, 897
 - deformation potentials 165
 - deionized water 329
 - d-electrons 139
 - delocalized metallic Ga–Ga bonds 449
 - density functional calculation 206
 - density functional theory (DFT) 137, 140, 819, 820
 - depolarization 1172, 1185
 - desorption 405, 412
 - desorption fluxes 406
 - desorption mass spectroscopy (DMS) 439, 443
 - desorption processes 389, 391
 - desorption spectra 51
 - d-hybridized upper valence band 139
 - diamagnetic component 1153, 1157
 - diamagnetic materials 1064
 - diamagnetism 1064
 - diamond-lattice structure 332
 - diatomic 399

- dichloromethane 470
 dielectric constant 18, 20, 21, 22, 27, 29, 32,
 34, 74, 89, 90
 dielectric function 20,22
 dielectric mask 529
 dielectric screening function 141
 diethylchlorine gallium 539
 differential polarization 285
 differential temperature 292
 diffusion-controlled processes 50
 diffusion length 403
 dilute GaAsN films 105, 330
 dilute magnetic semiconductor(s) 1082,
 1063,1123
 – II-VI and GaAs based 1123
 – II-VI based 1124
 – *ab initio* theories 1088
 – applications 1168
 – comparison of magnetic interactions 1101
 – GaAs based” 1133
 – RKKY theory 1088
 – theoretical aspects 1082, 1141
 – nanowires 1167
 – Zener theory 1088
 dilute nitrides 105, 202, 210
 dimethylhydrazine 512
 direct magnetization measurements 1157
 dislocations
 – 5/7 chain 828
 – charge profile 874
 – edge 821, 822, 823
 – edge and screw 821, 823
 – electronic structure 882
 – mixed 823
 – open core-5/7 atom ring 869
 – open core-eight atom ring 869
 dislocation density 394, 526
 dislocation density, *see* electron mobility
 dislocation–dislocation interaction 820
 dislocation-mediated surface
 morphology 460
 dislocation reduction 557, 578
 displacement vector D 264
 distributed Bragg reflector (DBR) 97, 661
 divacancy 934
 DLTS
 – applied to GaN 948
 – applied to ternaries of GaN 977
 – basics 939
 – dispersion in GaN data 970
 DLTS method 938, 948
 DLTS peaks 949
 DLTS signal 944, 945
 DLTS spectra 965
 DMS heterostructures 1126, 1127, 1177
 DMS materials 1116
 DMS systems 1090
 domain boundaries 495, 844
 – annihilation 641
 dominant compensating donor 937
 donors
 – shallow 1007
 donor–acceptor pair band 604, 1056
 donor-binding energies 611
 donor-bound excitons (DBE) 514, 610, 624
 donor electrons 1101
 donor–gallium vacancy complexes 936
 doping 1006
 – by point defects 917
 – co-doping for p-type 1018
 – magnesium 1014
 – p-type 1013, 1014
 doping with As 1044
 doping with Be 1038
 doping with C 1040
 doping with Ca 1042
 doping with Cd 1043
 doping with Ge 1011
 doping with Hg 1040
 doping with P 1045
 doping with rare earths 1045, 1046
 doping with Se 1012
 doping with Si 1010
 doping with Si, Ge, O 1010
 doping with transition metals 1046, 1060
 doping with Zn 1042
 Doppler broadening experiments 991
 Doppler broadening spectroscopy 988
 double-pulse DLTS 946, 974
 double exchange interaction 1088
 double exchange mechanism 1167
 double positioning boundaries (DPB) 496,
 818, 844
 down-spin channels 1079
 down-spin electrons 1080
 dry processing techniques 329
 d shell electrons 1048
 dual-flow channel reactor 666
 dual-interface heterostructures 132
 dynamical theory 423

e
 Eagle Picher sample 601
 e-beam evaporation 577, 722
 EBIC measurements 978
 EBIC method 981
 ECR microwave plasma-assisted MBE
 (ECR-MBE) 450

- edge dislocations 656, 824
- electronic structure 866
- effective acceptor activation energies 1034
- effective mass approximation 270, 272, 281
- effective mass parameters 143
- eight-atom core model 825, 837
- eight-atom ring character 825
- Einstein equation 403, 413
- elastic constants 37, 132
- elastic deformation 328
- elastic moduli 23,78
- elastic recoil detection analysis (ERDA) 1005
- elastic recoil detection method 1055
- elastic stiffness coefficients 63, 156, 159
- elastic stiffness constants 224
- electric field effect 972
- electric field strength 954
- electric force microscopy 587, 910
- electrical spin injection, *see* spin orientation
- electro-optic 383
- electroluminescence 1176, 1178
- electroluminescence (EL) experiment 1148
- electroluminescence (EL) images 744
- electrolytic etching technique 35
- electromagnetic theory 20
- electron acoustic phonon scattering 191
- electron beam incident 417
- electron beam induced current (EBIC) 977
- electron beam lithography 541
- electron-counting rule (ECR) 649
- electron concentration 525
- electron cyclotron resonance microwave plasma assisted molecular beam epitaxy (ECR-MBE) 410
- electron density 1038
- electron diffraction intensities 423
- electron dipole motion 1115
- electron effective mass 197, 205, 210
- electronegativity 66
- electron–electron interaction 133
- electron energy loss spectroscopy (EELS) 48
- electron–hole pairs 288, 673
- electron–hole recombination 279
- electron-initiated excitation 559
- electron–ion interaction 648
- electron-irradiated undoped GaN 1000
- electron mobility 526, 632, 966
- electron mobility, *see* dislocation density 966
- electron momentum 989
- electron momentum distributions 992
- electron–nuclear hyperne interaction 1001
- electron paramagnetic resonance 998 1134
- electron–phonon coupling 84, 955, 1043
- electron–phonon interaction 39, 173, 193, 194
- electron polarization 1115, 1116
- electron spin coherence 1186
- electron spin relaxation time 1178
- electron spin resonance (ESR) 172, 1052
- electron transport 84
- electronic band structure 131
- electronic degeneracy entropy 973
- electronic devices 977
- electronic energy levels 1105
- electronic paramagnetism 1065
- electronic Raman measurements 39
- electronic states 1038
- electronic structures 1091
- electronic thermal conductivity 53
- electronic wave functions 133
- electrooptic modulators 743
- ELO 559
 - stripes along the $\langle 11\bar{2}0 \rangle$ direction in HVPE ELO 561
 - three-step 557
 - two-step 547
- ELO process 622, 625
- ELO technique 623
- empirical pseudopotential approach 141
- empirical pseudopotential method (EPM) 151, 199
- empirical tight binding method (ETBM) 151
- energy dispersive X-ray (EDX) 688
 - analysis 191
 - spectroscopy 744
- energy-filtered TEM 1162
- energy-loss spectroscopy (EELS) measurements 837
- energy momentum 218
 - dispersion diagram 218
- energy transition site 414
- enthalpy 50
- envelope function approximation 219
- environmental transmission electron microscope 728
- epitaxial AlN films 639
- epitaxial casting strategy 756
- epitaxial core–sheath method 756
- epitaxial deposition techniques 323
- epitaxial film(s) 329, 448, 527, 597
- epitaxial GaN 447, 495
- epitaxial GaN film(s) 509, 522
- epitaxial GaN layer(s) 487, 498
- epitaxial growth temperature 525, 526, 603, 641
 - effect 525
- epitaxial lateral overgrowth (ELO) 6, 59, 324, 483, 511, 528, 1190

- HVPE 537
 - maskless 557
 - Nano-ELO 564
 - point defects 558
 - selective 537
 - SiN and nanonets 569
 - stripes along the $\langle 1 \ 1 \ 0 \ 0 \rangle$ direction in HVPE
 - W masks 583
 - epitaxial lateral over-growth on Si 539
 - a-plane GaN 616
 - pendeo-epitaxy 540
 - pendeo-epitaxy on Si 544
 - pendeo-epitaxy on SiC 542
 - epitaxial layer(s) 72, 259, 291, 327, 328, 382, 469, 474, 478, 482, 493, 841
 - epitaxial nitride layers 395
 - epitaxial process 527
 - epitaxial relationship 293, 372, 377
 - epitaxy 353, 369
 - EPR 998
 - EPR measurements 1003
 - equation of state (EOS) 37
 - equilibrium bond lengths 681
 - equilibrium growth 406
 - etch pitch density (EPD) 331, 528
 - etch pit delineation process 576
 - etching methods 552
 - evaporation coefficients 449
 - Ewald construction 417
 - Ewald sphere 419
 - excimer laser deposition technique 469, 599
 - excitation-induced carriers 283
 - excitation-power-density 1161
 - excitation probability 1114
 - exciton-binding energies 227, 611
 - excitonic emission 1012
 - excitonic spectrum 610
 - excitonic transitions 555
 - exciton spin scattering 1133
 - exothermic nature 413
 - expanded equilibrium vapor pressure data 51
 - ex-situ* preparation 370
 - ex-situ* processes 369
 - Extended defects
 - electronic structure 863
 - extended X-ray absorption fine structure (EXAFS) 933
 - external quantum efficiency (EQE) 624
 - extraordinary Hall effect (EHE) 1141
- f**
- face-centered cubic sublattices 144, 611
 - Faraday effect 1105, 1118, 1127, 1186
 - Faraday rotation 1104, 1105, 1106, 1107, 1108, 1118, 1119
 - Fermi–Dirac distribution 941
 - Fermi–Dirac function 196, 197
 - Fermi energy 1080, 1104, 1132, 1134, 1141
 - Fermi level position 189, 929, 1153
 - Fermi wave vector 1186
 - ferromagnetic behavior 1153
 - ferromagnetic coupling 1128
 - ferromagnetic-diluted semiconductor materials 1187
 - ferromagnetic electrodes 1079, 1172
 - ferromagnetic exchange coupling 1184
 - ferromagnetic film 1078, 1139
 - ferromagnetic (FM) configuration 1100
 - ferromagnetic GaN 1107, 1109
 - ferromagnetic interaction 1100, 1171
 - ferromagnetic layers 1180
 - ferromagnetic materials 1067, 1080
 - ferromagnetic metals 1078, 1131, 1168, 1179
 - ferromagnetic regime 1109
 - ferromagnetic samples 1071
 - ferromagnetic semiconductors 1076
 - ferromagnetic state 1070, 1072, 1101
 - ferromagnetic transition 1093, 1133
 - temperature 1134, 1143
 - ferromagnetism 1123, 1130, 1134, 1136, 1144, 1150, 1152, 1156, 1158, 1160, 1163, 1164, 1167, 1169, 1171, 1178, 1187, 1188
 - field-effect transistors 326, 508, 1010
 - field emission (FE) SEM image 749
 - filled-core screw dislocations 832
 - finite difference time domain (FDTD) 742
 - finite-element method 538
 - first-order approximation 197
 - first-order desorption kinetics 402
 - first-order kinetic model 450
 - first-order LEED spot 645
 - first-order phonon Raman scattering 40
 - first-order Raman modes 738
 - first-principles calculations 166, 224
 - first-principles techniques 140
 - Float Zone (FZ) method 332
 - FM state 1121
 - forbidden energy regions 132
 - four hydrogen atoms 926
 - Fourier components 424
 - Fourier filtering 822
 - Fourier series 424
 - Fourier transform analysis 962
 - Fourier-transform infrared-absorption spectroscopy 1036
 - Fourier transform infrared (FTIR) 998
 - measurements 998

- four probe 54
 - F parameter 172
 - fractional ionic character (FIC) 12
 - Franks screw dislocation 732
 - mechanism 732
 - Frank-van der Merve (FM) 415
 - free-carrier charge 272
 - free-carrier density 279
 - free carrier induced field 279
 - free-carrier plasma 89
 - free-carrier screening 270, 278
 - free-electron approach 132
 - free-electron approximation 133
 - free-electron concentration 87
 - free electron energy 135
 - free electron model 134
 - free electron picture 1080
 - free-electron recombination band (FERB) model 194
 - free electrons 929
 - free energy 536
 - free enthalpy 550
 - free excitons (FE) 610
 - free positron wave 988
 - freestanding bulk layer 580
 - FTIR 998
 - full-core screw dislocation 828, 831
 - full potential linearized augmented plane wave (FP-LAPW) method 138
 - full potential LMTO (FP-LMTO) calculations 137
 - full width half maximum (FWHM) 64, 178, 364
- g**
- GaAs 329, 1120
 - surface preparation 331
 - GaAs analogy 388
 - GaAs-based superlattices 264
 - GaAs model 390
 - GaAs spacer layers 1182
 - GaAs substrate 332
 - GaAs system 174
 - GaAs technology 477
 - Ga-bilayer model 414, 596
 - Ga-containing alloys 697
 - Ga desorption mechanism 401
 - Ga-droplet growth regime 455
 - Ga-droplet regime 458
 - Ga-face profile 477
 - Ga-face sense polarity 624
 - Ga-filled-core model 831
 - Ga-filled-core screw dislocation 831
 - GaInAsN 210
 - GaInPN 212
 - gallium antistite 935
 - gallium arsenide (GaAs) 477
 - gallium interstitial 934
 - gallium nitride 30, 49
 - gallium nitride epitaxy 500
 - Ga melt 363
 - GaN 35, 47, 56, 61, 361, 362, 365, 372, 392, 398, 416, 438, 466, 506, 528, 608, 719, 1177
 - alloy/multiple layer nucleation layers on SiC 491
 - doped with Cr 1156
 - doped with Gd 1163
 - doped with rare earths 1163
 - doped with V 1163
 - epitaxial relationship to a-plane sapphire 375
 - epitaxial relationship to c-plane sapphire 374
 - epitaxial relationship to LiGaO₂ and LiAlO₂, and pervoskites 382
 - epitaxial relationship to r-plane sapphire 376
 - epitaxial relationship to sapphire 373
 - epitaxial relationship to Si 381
 - epitaxial relationship to SiC 381
 - heteroepitaxial deposition 528
 - high temperature nucleation layers on SiC 486, 489
 - low temperature interlayers 584
 - low temperature nucleation layers on SiC 488
 - nucleation layers on SiC 482
 - pertinent surfaces, c, a, m planes 365
 - seeded growth 363
 - seedless growth 362
 - GaN-AlN
 - nucleation layers on SiC by MBE 492
 - GaN and AlN
 - epitaxial relationship to sapphire 372
 - GaN-based electronic devices 62
 - GaN-based optical devices 62
 - GaN-based semiconductors 1190
 - GaN buffer layer(s) 446, 598, 636, 638
 - GaN-carbon composite nanotubes 758
 - GaN crystalline quality 404
 - GaN crystals 361, 362, 364
 - GaN decomposition 527
 - GaN deposition 382, 386
 - GaN desorption 399
 - GaN epitaxial layers 372, 492, 606, 817
 - GaN epitaxial relationship 372
 - GaN equivalent flux 440
 - GaN film orientation 624

- GaN films 372, 374, 399, 407, 409, 491, 545, 569
 - GaN formation 417
 - GaN growth a-plane 613
 - GaN growth m-plane 623
 - GaN growth on GaAs 477
 - GaN growth on porous SiC (PSiC) 503
 - GaN growth on sapphire 512
 - effect of III/V ratio on nucleation layer 523
 - effect of pressure on nucleation layer 525
 - low temperature nucleation layers 513
 - GaN growth on GaN templates 605
 - GaN growth on LiGaO₂ and LiAlO₂ 603
 - GaN growth on non-c-plane substrates 611
 - GaN growth on Si 507
 - GaN growth on SiC 479, 499
 - GaN growth on spinel (MgAl₂O₄) 611
 - GaN growth on ZnO 598
 - GaN growth p-type 627
 - GaN growth technology 462
 - GaN kinetic model 398
 - GaN lattice parameter 47
 - GaN layers 384, 435, 456, 586
 - structure 586
 - GaN low-temperature buffer layer 508
 - GaN on SiC
 - double positioning boundaries (SMB) 496
 - inversion domain boundaries (IDB) 496
 - stacking mismatch boundaries (SMB) 496
 - substrate misorientation and domain boundaries 495
 - polarity 498
 - GaN optical phonon energies 42
 - GaN phase diagram 61
 - GaN phase growth rate 657
 - GaN platelets 363
 - GaN-related materials 818
 - GaN stacking faults and epitaxial relationship to SiC 480
 - GaN stripes 531
 - GaN-substrate interface 287
 - GaN surface 370
 - T and H sites 366, 368
 - GaN surface preparation 369
 - GaN synthesis reaction 399
 - GaN synthesis temperature 52
 - GaN templates 361, 363, 605
 - Ga-polar films 587, 591
 - Ga polarity 234, 381
 - on sapphire 586, 597
 - Ga-polarity films 439, 598
 - Ga-polarity GaN 588
 - Ga polarity sample(s) 390, 500, 509
 - Ga-polarity surfaces 273, 365
 - Ga-polar matrix 587
 - Ga-polar sample 222
 - Ga-polar surface 363, 365, 402
 - Ga-polar wings 620
 - GaN QD arrays 714
 - Ga-rich conditions 367, 407, 457, 831, 935
 - Ga-rich dislocation core model 834
 - Ga-rich growth regime 455
 - Ga-rich regime 414, 460
 - Ga-rich structure 594
 - Ga solution 384
 - Ga sticking coefficient 440
 - Ga-substitutional acceptors 1007
 - Ga vacancy concentration 997
 - Ga-vacancy configuration energy 932
 - Ga-vacancy model 366
 - Ga vacancy-oxygen complexes 990
 - GaPN 210
 - gaseous species 388
 - gas manifolds 400
 - gas-phase diffusion rate 400
 - gas-phase etching 329
 - gas-phase product 396
 - gas-phase reactions 389, 488
 - gas-phase species 390
 - gas pressure technique 49, 52
 - gas-source MBE (GSMBE) 442
 - gas-source molecular beam epitaxy 210
 - Gaussian-like distribution 170
 - Gd-doped GaN samples 1164
 - Ge doping 1011
 - generalized gradient approximation (GGA) 9, 1091
 - generalized quasi chemical approximation (GQCA) 698
 - geometric theory 418
 - giant magnetoresistance (GMR) 1080
 - Gibbs free energy 49, 50, 431, 947
 - grain boundary (GB) 862
 - green luminescence band 1043
 - Green's function theory 140
 - Green's method 421
 - ground-state energy 283
 - growth chamber 369
 - growth kinetics 700, 993
 - growth of nitrides 462
 - growth phase 391
 - growth process 392
 - growth rate anisotropy 362
 - growth-related parameters 672
- h**
- half-order diffraction 594
 - halide precursor techniques 385

- Hall data 1139
- Hall effect 87, 197, 1001, 1103, 1104, 1141, 1143, 1144
 - measurements 59, 81, 91, 198, 475, 489, 666, 697, 1040, 1191
- Hall electron concentration 197
- Hall mobility 632
- Hall resistance 1171
- Hamiltonian matrix 213
- Hamiltonian operator 135
- Hanscom sample 601
- Hartree-Fock method 140
- Hartree-Fock (H-F) theory 137
- HCl etching techniques 479
- heat of evaporation 49
- heat of sublimation 17, 49
- heavy-hole bands 207, 1110, 1117
- heavy hole (hh) effective masses 173
- heavy-hole excitations 1127
- heavy-hole subbands 1115
- heavy-hole transition 1115
- He-Cd laser 607
- Heisenberg spin glass 1144
- Hermann-Mauguin notation 2, 62
- H-etched samples 340
- heteroepitaxial film 327, 328, 606
- heteroepitaxy 822
- heterointerface 565
- heterojunction bipolar transistors 110
- heterojunction field effect transistor (HFET) 35
- heterojunctions 384
- heterostructure deposition systems 393
- heterostructures 264, 425, 1125, 1179, 118, 1186
- hexagonal cells 484
- hexagonal close packed (hcp) 2, 143, 426
 - sublattices 2, 143
 - wurtzitic structures 839
- hexagonal compact packed (hcp) structure 819
- hexagonal GaN 331, 612
- hexagonal lattice structure 374
- hexagonal morphology 523, 526
- hexagonal pits 458
- hexagonal SiC substrates 381
- hexagonal stacking 498
- hexagonal structure 481
- hexagonal symmetry 293, 643
- hexagonal wurtzite structure 641
- Hg-acceptor level 1040
- Hg implantation 1043
- high-density crack network 658
- high electron momentum 990
- high energy electron diffraction 631
- high-energy O peak 370
- high hydrostatic pressures 929
- high-mist systems 327
- high-mobility GaN 446
- high nitrogen flux rate 100
- high nitrogen pressure solution growth (HNPSG) 362
- high-performance electronic devices 652
- high-performance optical emitters 286
- high piezoelectric constants 326
- high power field-effect transistors 334
- high-pressure anvil method 52
- high-pressure apparatus 358
- high-pressure growth 527
- high-pressure method 365
- high-pressure techniques 36
- high-quality compound semiconductor growth 416
- high-quality epilayers 630
- high-quality epitaxy 632
- high-quality freestanding GaN template 54
- high-quality GaN films 468, 654
- high-quality OMVPE 635
- high-quality semiconductor films 387
- high-quality single crystalline material 77
- high-quality thin films 366
- High-quality ZnO substrates 353
- high-resistivity GaN 1039, 1041
- high-resistivity material 627, 628
- high-resistivity SiC substrates 327
- high-resistivity substrates 334
- high-resolution electron microscopy 850
- high-resolution image 822
- high-resolution TEM analysis 1167
- high-resolution top-view lattice image 841
- high-resolution transmission electron microscopy (HREM) 819
- high-resolution X-ray diffraction (HRXRD) 474
 - measurements 42
- high-resolution X-ray diffractometry 658
- high-resolution Z-contrast imaging 825
- high-temperature AlN nucleation layers 486
- high-temperature annealing technique 346
- high-temperature ferromagnetism 1162
- high-temperature GaN buffer layers 488, 489, 590
- high thermal conductivity 62
- hillocklike feature 58
- HNPSG Method 363
- hole concentration 1015, 1018, 1025, 1026, 1041, 1042

- hole effective masses 132, 150, 159, 164, 168, 171, 173, 174, 175, 182, 184, 197, 202, 216, 225, 288, 708, 1025
 - hole exchange interaction 1153
 - hole wave functions 1179
 - hollow core screw dislocations 336
 - hollow pipes 840
 - Holt inversion domains 845
 - Holt-type IDB 846, 850
 - homoepitaxial AlN films 178
 - homoepitaxial growth 369, 456
 - homogeneous biaxial stress 158
 - homogeneous elastic strain 327
 - homogeneous emission 561
 - homogeneously mixed 387
 - homogeneous strain 638
 - honeycomb silicate adlayer 341
 - Hooke's law 154, 156, 158
 - hopping conductivity 1131
 - horizontal dislocations 559
 - Hund's rule 1047, 1046, 1048, 1124
 - HVPE-grown films 393
 - HVPE-grown samples 834
 - hybridization 1047, 1060, 1128, 1188
 - constant 1085
 - hydrazine 436
 - hydride vapor phase epitaxy (HVPE) 36, 323, 326, 385, 387, 537, 818
 - buffer layers 468, 836, 1061
 - freestanding templates 468
 - growth mechanism 388
 - initial nucleation layer 388
 - reactor 625, 997
 - technique 599, 654
 - template 472, 834
 - hydrocarbons 1005
 - efficient desorption 1005
 - hydrogen 393, 397, 1004, 1005
 - experimental results 1005
 - role 1004
 - hydrogenation process 334
 - hydrostatic pressure coefficients 42, 64
 - hyperfine interaction tensor 1000
 - hypothetical epitaxy 846
 - hysteresis 1167, 1171, 1172
 - loops 1143, 1158, 1163
 - hysteretic behavior 1131
- i*
- image dislocation 550
 - image-processing system 425
 - imperial expression 169
 - impinging species 516
 - implantation energy 986
 - InAlGaN
 - spinoidal decomposition 705
 - quaternary 99
 - InAlN
 - alloy 97
 - miscibility gap 697
 - spinoidal decomposition 697, 698
 - InAsN 208
 - indirect gap semiconductor 210
 - indium-silicon codoping 666
 - indium doping 527
 - indium nitride 75, 77
 - inductively coupled plasma (ICP) 428
 - inferior carrier transport 453
 - infrared (IR) 432
 - measurements 39
 - region 695
 - spectroscopic ellipsometry 470
 - InGaAlN
 - quaternary, growth 699
 - InGaAs quantum well 211, 1135
 - InGaN
 - alloys 92
 - composition pulling effect 93
 - doping 678
 - growth 671
 - layers 672
 - phase separation 479
 - surface reconstruction 689
 - V-defects 674
 - InGaN/GaN quantum wells 286
 - inhomogeneous strain distribution 519, 682
 - injection laser experiments 371
 - InN
 - growth 629
 - in-plane components 218
 - in-plane current 1173
 - in-plane deformation potentials 160
 - in-plane heavy-hole mass 225
 - in-plane homogeneity 470
 - in-plane lattice mismatch 505
 - in-plane light-hole mass 225
 - in-plane rotation 334
 - in-plane strain 158, 278
 - in-plane strain anisotropy 155
 - in-plane stress-strain relationship 158
 - InPN 209
 - input fluxes 406
 - InSbN 209
 - in situ* annealing 577, 597
 - in situ* buffer morphology 482
 - in situ* methods 402, 477
 - in situ* preparation 370
 - in situ* RHEED images 590

- intentional doping 1006
 - interaction between magnetic ions 1086
 - interfacial relationship 480
 - interlayer-induced strain 659
 - interlocking spiral ramps 456
 - internal cell parameter 103
 - internal magnetic induction 1064
 - internal parameter 6, 7, 103, 105, 107, 140, 156, 233, 240, 241, 251, 285
 - interstitial antibonding site 1038
 - interstitials 928, 934
 - Ga 934
 - N 935
 - intracenter absorption band 1054
 - intramagnetic ion levels 1071
 - inverse susceptibility 1126
 - inversion domains 818
 - inversion domain boundaries (IDBs) 324, 819, 844, 845, 901
 - Holt-type 844, 847
 - induced by Mg doping 900
 - V-type, IBD* 845, 847
 - inversion-type planar defects 844
 - inverted pyramids 457
 - ion-assisted reactive 641
 - ion beam assisted deposition (IBAD) 24
 - ionic bond 416
 - ionic core-core repulsion 820
 - ionic model potentials 141
 - ion implantation 1189, 1190
 - ion-ion interactions 1090
 - ionization energy 1034, 1040
 - ion scattering spectroscopy 587
 - IR ellipsometry measurements 190
 - island growth mode 415
 - isoelectronic impurities 1009, 1044
 - isothermal capacitance transient analysis 954
 - isothermal capacitance transient spectroscopy (ICTS) 945
 - isothermal remanent magnetization 1144
 - isotropic parabolic conduction band 160
- j**
- Jahn–Teller effect 999, 1061
 - Jahn–Teller model 1062
- k**
- Kane model 197
 - Kelvin microscopic investigation 563
 - Kerr effect 1104
 - Kerr rotation (KR) 1108
 - kinematical scattering theory 419
 - kinematic theory 423
 - kinetic considerations 392
 - kinetic energy 136
 - kinetic model 390, 405
 - kinetic parameters 436
 - kinetic theory 53
 - Knoop diamond indenter 63
 - Knoop's hardness 15, 16, 23, 30, 63
 - Knudsen effusion cells 410
 - Koster-Slater model 947
 - k.p* calculations 199
 - k.p* model 143
 - k.p* theory 160
 - Kronig-Penney approach 133
- l**
- Langer-Heinrich rule 1062
 - Langmuir evaporation data 449
 - large angle convergent beam electron diffraction (LACBED) 619
 - large bandgap bowing parameters 106
 - large stress fields 926
 - large thermal conductivity 334
 - laser-assisted CVD 394, 638
 - laser diode (LD) 696, 1014
 - laser-induced liftoff 472
 - laser liftoff (LLO) 462, 468, 471, 607
 - lasers employing films 371
 - lateral diffusion barrier 414
 - lateral dislocations 550
 - lateral epitaxial overgrowth (LEO) 324, 539, 546, 583
 - lateral growth 394
 - laterally contracted bilayer (LCB) 596
 - lateral propagation 543
 - lattice constants 102, 202, 351
 - lattice-matched AlInGaN alloy 265
 - lattice-matched barrier 97
 - lattice-matched conditions 62
 - lattice-matched system 710
 - lattice matching composition 262
 - lattice misfit 295
 - strain 382
 - lattice-mismatched film 328
 - lattice-mismatched substrates 324, 326, 377, 752
 - lattice mismatch (lm) 185, 375
 - component 290
 - problem 328
 - lattice nuclei 1003
 - hyperfine interaction 1003
 - lattice parameter 382, 494
 - lattice parameter mismatch 294
 - lattice specific heat 53
 - Lau condition 419, 424
 - Lau rings 420

- Lau treatment 419
 layer-plus-island growth mode 415
 LEEBI treatment 1016
 LEED patterns 597
 Leibfried-Schloman scaling parameter 79
 Lenz's law 1065
 Levenberg-Marquardt algorithm 580
 LiAlO₂ 358
 LiGaO₂ 355
 light-hole subbands 1115
 light-emitting devices 717
 light-emitting diodes (LEDs) 616, 696, 817,
 1014, 1077
 light-hole bands 207, 1117
 light-hole dispersion 209
 linear combination of atomic orbitals
 (LCAO) 37, 133, 819
 linear interpolation 282
 linear muffin-tin orbitals method (LMTO) 78,
 136, 139
 linear polarization 284
 linear system 161
 linear thermal expansion coefficients 79
 linearized augmented plan wave (LAPW)
 method 136, 1100, 1156
 line-of-sight quadrupole mass
 spectrometry 401, 402
 liquid encapsulated Czochralski (LEC)
 method 330
 lithium gallate (LGO) 355, 603
 lithographical step 547
 lithographic/etching techniques 736
 lithography 469
 local density approximation (LDA) 9,
 137
 local density formalism (LDF) 138
 local density functional theory 648
 local probe analysis 563
 local strain modification 551
 local vibrational modes (LVMs) 1036
 long haul fiber-based communications
 systems 211
 longitudinal heterostructures 737
 longitudinal optical (LO) phonon
 frequencies 20
 long-period corrugation 644
 long-period structure 644
 long-range Coulomb interactions 820
 long-wavelength lasers 110
 LO phonon-plasmon coupled modes
 (LPP) 561, 563
 Lorentz force 1065, 1131
 Lorentzian peaks 64
 low-energy crystal 411
 low-energy electron beam irradiation
 (LEEBI) 628, 1014
 low-energy electron diffraction (LEED) 341,
 639
 low-energy ion-assisted growth 641
 low-energy state 1069
 lower thermal conductivity materials 55
 lower valence bands (LVBs) 628, 1017
 lowest intensity atomic columns 836
 low free-electron concentration 47
 low-lying conduction electron state 219
 low pressure (LP) 584
 low-pressure Hg lamp 178
 low substrate temperature buffer growth 330,
 590
 low-temperature buffer growth 590
 low-temperature CL image 662
 low-temperature data 177
 low-temperature deposition processes 467
 low-temperature free-exciton transition 177
 low-temperature GaN buffer layer 478
 low-temperature interlayer 584
 low-temperature nitridation 590
 low-temperature nucleation buffer
 layers 386, 467, 514
 low-temperature photoluminescence
 mapping 470
 low-temperature process 734
 LT AlN insertion buffer layers 585
 LT insertion layer 658
 Luckovsky fit 1056
 luminescence 1110, 1116
 – band 1163
 – efficiency 558
 – images 471
 – line 1060
 luminescent lifetime 1060
 Luttinger-Kohn model 215
 Luttinger parameters 152, 161, 173, 174, 175,
 183, 201
 luzonite-like (LZ) structure 246, 254
 Lyddane-Sach-Teller relationship 22
- m**
 magnesium doping 1014
 magnetic anisotropy 1129
 magnetic circular dichroism (MCD) 1104,
 1109, 1119
 – measurements 1158
 magnetic coupling strength 1177
 magnetic dopant 1103
 magnetic electrons 1088, 1090
 magnetic field 998, 1064, 1071, 1084, 1116,
 1135, 1139, 1147, 1158, 1180, 1182, 1184

- magnetic field effect transistors (M-FETs) 1123
- magnetic ions 1067, 1074, 1076, 1082, 1083, 1084, 1085, 1086
- magnetic ion spin 1084
- magnetic moment(s) 1063, 1066, 1068, 1069, 1070, 1079, 1080, 1082, 1133
- magnetic polarization 1064
- magnetic polaron binding energy 1132
- magnetic properties
 - Mn-doped GaN 1143
- magnetic quantum dot (MQD) 1123
- magnetic random access memory (MRAM) 1081
- magnetic-recording industry 1080
- magnetic resonance 999
 - methods 1000
 - optical detection 999
- magnetic semiconductor 1075, 1078
- magnetic sensor heads 1078
- magnetic susceptibility 1066, 1126
- magnetic tunnel junctions (MTJs) 1078
- magnetization 1108, 1118, 1119, 1126, 1139, 1164, 1167, 1168, 1171, 1173, 1176, 1182, 1188
 - curves 1154
 - data 1160
 - hysteresis 1146
 - measurements 1128, 1158, 1163, 1167
- magneto-optical data 1139
- magneto-optical effect 1107
- magneto optical Kerr effect (MOKE) 1104, 1108
- magneto-optical measurements 1133, 1157
- magneto optical properties
 - TM doped GaN 1146
- magneto-optical spectroscopy 1146, 1148
- magneto-optics studies 1128
- magneto-photoluminescence 1127
 - measurements 1164
- magneto electrical measurements 1103
- magneto reflectivity data 1148
- magneto reflectivity measurements 1147
- magnetoresistance 1139, 1131, 1162
 - measurements 1104, 1186
 - effect 1180
- magneto transport 607
 - measurements 1103, 1168
- magnetron sputter deposition 641
- magnitude 420
- maskless epitaxial lateral overgrowth 557
- mass flow controllers (MFC) 408
- mass spectrometer 49, 438, 447, 462
- mass spectroscopic techniques 398
- mass spectroscopy experiments 432
- mass transport 391
- material-specific parameters 212
- maximum electron mobility 635
- maximum growth rate (GR) 330
- Maxwell-Garnett approximation 191
- MBE 409, 460, 733
 - adsorption 411
 - buffer layers 597
 - decomposition 416
 - effect of III/V ratio on growth 455
 - experiments 993, 1017
 - GAN films 460, 832
 - incorporation 415
 - MBE growth
 - N species for growth 451
 - PAMBE growth 435, 446
 - reactive ion 435
 - RF N source 430
 - RF N species 431
 - RMBE growth 435, 437
 - surface diffusion 413
 - surface reconstruction 426, 427, 428, 429
 - UHV system 369
- Magnetic Circular Dichroism (MCD) 1109
 - data 1131, 1160
 - effect 1110
 - intensity 1130
 - measurements 1129, 1132, 1133
 - signal 1132
 - spectra 1128, 1158
- mean atomic column peak intensity 836
- mean free path 56
- mechanical chemical polish (MCP) 338
- melting temperature 49, 68
- membrane-based method 736
- metallic adlayer structures 651
- metallic gallium 387
- metallic layers 1180
- metalorganic chemical vapor deposition 385
- metal-organic MBE (MOMBE) 637
- metalorganic precursor 397
- metalorganic pyrolysis 396
- metalorganic vapor phase epitaxy 385
- metal-rich growth 647
- metal-semiconductor contacts 365
- metastable growth process 416, 437
- metastable zinc blende GaN epitaxial films 330
- Mg-augmented ELO 536
- Mg-doped GaN 1000, 1015, 1034, 1035, 1036
- Mg-doped *p*-type GaN layer 753
- Mg-doped samples 985, 991
- M-H hysteresis loops 1143, 1144, 1156, 1163

- microcathodoluminescence studies 76, 190
 - micro-Raman scattering 198
 - microwave-excited nitrogen 636
 - Mie resonances 76, 187, 191
 - Mie resonant absorption 86
 - Mie theory 191
 - migration-enhanced epitaxy (MEE) 404, 632
 - Miller-Bravais indices 343, 372
 - Miller index planes 531
 - minority carrier lifetime 977
 - minority carrier transient spectroscopy (MCTS) 963
 - miscibility gap
 - InAlN 697
 - misfit accommodation (MA) 327
 - misfit dislocations 822
 - misfit strain 293, 295
 - mist-induced piezoelectric polarization 260
 - mixed anion host materials 212
 - mixed cation ternary host materials 212
 - mixed dislocations 836, 841
 - electronic structure 866
 - Mn complexes 1060
 - Mn-doped ferromagnetic GaAs 1103, 1135
 - Mn-doped GaN 1048
 - model dielectric matrix 141
 - moderate-temperature nucleation layers 514
 - MODFET structures 268
 - modulation doped field effect transistor (MODFET) 35
 - modulation-doped structures 169, 264
 - molar fraction 259
 - function 259
 - molecular beam epitaxy (MBE) 323, 409, 450, 824
 - molecular cohesive energy 410
 - molecular stream epitaxy (MSE) 677
 - molecular weight 35
 - MOMBE systems 1045
 - monatomic interstitial hydrogen 924
 - monatomic nitrogen 438
 - monochromatic CL image 559
 - monocrystalline 605
 - monolayer units 412
 - monomethylsilane 1012
 - monovacancy defects 992
 - Monte Carlo calculations 83
 - Monte Carlo simulations 1144
 - Moss-Burstein effect 86, 186, 188, 189
 - Moss-Burstein shift 75, 76, 186, 187, 189
 - Mott critical density 189
 - Motts transition 197
 - concentration 197
 - multibeam optical stress sensor (MOSS) system 491
 - multiheterolayer buffer structures 299
 - multiple interface heterostructures 278
 - multiple layer nucleation layers 491
 - multiple quantum disk (MQD) nanocolumn 753
 - multiple quantum well (MQW) 608
 - Murnaghan's EOS 37
- n**
- nanocrystalline GaN thin films 723
 - nanoheteroepitaxy (NHE) 503, 564
 - nanoimprint lithography 569
 - nanopipes 818, 840, 841
 - nanostructures 725
 - coaxial heterostructures 755
 - core multishell structures 744, 746
 - FETs 746
 - multiple quantum disk LEDs 753
 - nanowires and heterostructures 737
 - preparation 725
 - properties 725
 - synthesis 726
 - synthesis by confined chemical reactions 735
 - synthesis by template based-methods 735
 - synthesis by self catalytic vapor-liquid-solid (VLS) process 730
 - synthesis by vapor-liquid-solid process 727
 - synthesis by vapor phase 726
 - vapor-solid process 732
 - nanotubes 756
 - nanowire(s) 737
 - growth 734
 - optical emission 743
 - stimulated emission 744
 - synthesis in solution 734
 - nanowire FETs 749
 - native defects 929, 1000
 - N-beam case 424
 - N-containing gases 653
 - N-deficient layers 409
 - N-doped GaP 210
 - near field scanning optical microscopy (NSOM) 617
 - near-infrared photoluminescence 1044
 - negative-U system 1004
 - negative ion defects 995
 - neighbor bond lengths 105
 - N-face sense polarity 624
 - nitridation process 349, 513, 597
 - nitride-based optoelectronic devices 1015

- nitride-based semiconductors 75
 - nitride-based ultraviolet detectors 652
 - nitride crystal growth 361
 - nitride epitaxy 324
 - nitride family 75
 - nitride film 396
 - nitride growth techniques 384
 - nitride heterostructures 270
 - nitride semiconductor alloys 102, 269
 - nitride semiconductor family 102
 - nitride semiconductors 47, 131, 140, 323, 359, 383, 395
 - nitrides 1, 39, 851
 - nitrogen antisite 935
 - nitrogen concentrations 109
 - nitrogen dissociation pressure 49
 - nitrogen flux 454
 - nitrogen incorporation efficiency 440
 - nitrogen-limited growth 454
 - nitrogen precursor 585
 - nitrogen pressure 50
 - nitrogen-rich conditions 407
 - nitrogen-rich growth regime 693
 - nitrogen species 452
 - nitrogen vacancies 930, 931, 932
 - N-limited growth conditions 448
 - nonisomorphic substrates 496
 - nonlinear core corrections 139
 - nonlinearity of polarization 245
 - nonlinear optical properties 641
 - nonlinear optics properties 383
 - nonlinear polarization 276
 - nonmagnetic ion 1132
 - nonmagnetic materials 1078
 - nonmagnetic semiconductors 1064
 - nonplasma-based growth techniques 435
 - nonpolar surface 223
 - novel method 638
 - N-plasma conditions 634
 - N-polar films 591, 635
 - N-polarity 234
 - films 598
 - samples 266, 453
 - N-polar layer 994
 - N-polar surface 364, 365
 - N-polar wings 620
 - N-rich conditions 367, 450, 594
 - N-rich growth regime 455
 - N-rich regime 460
 - NSOM measurements 620
 - N-type GaN platelets 364
 - nucleation buffer layer 479, 480, 482, 492, 523
 - nuclei formation 527
- o**
- octahedral sites 611
 - ODMR method 998, 1000
 - Omega rocking curves 614
 - OMVPE
 - Ga and N precursor adsorption and desorption 400
 - Ga and N precursor adsorption and desorption, activation energy 401
 - Ga and N surface diffusion 403
 - GaN desorption as it relates to growth 398
 - growth mechanism 398
 - kinetic model – balance between adsorption and desorption 405
 - low-temperature nucleation buffer layers 513
 - reactors 393
 - samples 581, 628, 948, 952, 984, 1061
 - systems 395, 408, 583
 - technique 393, 636
 - OMVPE-grown films 1035
 - OMVPE-grown layers 1017
 - OMVPE-sources 467
 - one-dimensional growth mechanism 738
 - one-dimensional stress 292
 - one-dimensional system 269
 - one-electron model 132
 - one-electron picture 133
 - one-electron wave functions 137
 - one-monolayer adsorption model 390
 - open-core edge 841
 - open-core screw dislocation 828, 831, 840
 - optical absorption coefficient 71
 - optical absorption measurements 76, 95
 - optical absorption technique 191
 - optical beam 1109
 - optical detection of magnetic resonance 998
 - optical devices 977
 - optical emission 704
 - spectra 432
 - optical emitters 629
 - optical excitation 1110
 - optically detected electron paramagnetic resonance (ODEPR) 935
 - optically pumped ultraviolet-blue stimulated emission 741
 - optical microscopy 459
 - optical processes 600
 - optical spectrum 492
 - optical surface reflectometry 521
 - optical transitions 1060, 1110, 1163
 - optical transmission measurements 95
 - optical transmission spectra 1057
 - optimal growth temperature 699

- optimum stripe orientation 621
 optoelectronic devices 225, 384, 623, 1034
 orbital angular momentum 1072
 order–disorder phase transitions 588, 594
 organic chemical vapor deposition 684, 733
 organometallic precursor gases 395
 organometallic source 468, 730
 organometallic vapor phase epitaxy (OMVPE) 323, 385, 393, 825 470, 565
 orthogonalized plane wave (OPW) method 134
 orthorhombic cell 382, 383
 orthorhombic structure 382
 out-of-plane component 218
 out-of-plane deformation potentials 160
 out-of-plane lattice constant 463
 out-of-plane rocking curves 465
 out-of-plane sound velocities 57
 out-of-plane strain 276
 out-of-plane stress 155
 oxidation state 1050
 oxygen-bonded silicon 341
 oxygen doping 1013
 oxygen-terminated surface 356
- p**
- parabolic band structure 216
 parabolic conduction band 216
 paramagnetic materials 1157, 1064
 paramagnetic regime 1109
 paramagnetism 1004
 parametric variations 387
 parasitic gas-phase chemical reactions 653
 Pauling's electronegativity 138
p-doping 667
 peak electric field 946
 peak electron drift velocity 83
 peak transition energy 616
 pendeo-epitaxial film 543
 pendeo-epitaxial growth 540, 542
 pendeo-epitaxial phenomenon 542
 pendeo-epitaxy 507, 540, 541, 621
 periodic stacking faults 852
 perovskite cell 383
 perovskite oxide(s) 296, 382
 – substrates 295
 phase separation 93
 phase shift 1120
 phonon dispersion curves 41
 phonon energies 20
 phonon frequency 20
 phonon-phonon scattering 57, 79
 phonon-phonon Umklapp scattering 53
 photoelastic effect 1120
 photoelastic modulator (PEM) 1120
 photoelectron spectroscopy 208
 photoemission experiments 139
 photoemission methods 271
 Photoemission studies 1134
 photoemission transient capacitance methods 961, 976
 photoexcitation 1116
 photo-generated carriers 1077
 photoionization spectroscopy 1041
 photolithography step 557
 photolithography techniques 530
 photoluminescence 288, 407, 462, 635, 1018
 – data 578
 – efficiency 598
 – experiments 185, 930
 – intensity 615
 – measurements 483, 604, 637, 1040
 – spectra 435, 489, 587, 602, 606, 608
 photomodulated transmission 95
 photon energy resonates 961
 photoreflectance (PR) spectra 87, 626
 piezo component 276
 piezoelectric (PE) coefficients 132, 180, 641
 piezoelectric charge 262
 piezoelectric constants 240, 259
 piezoelectric effects 95, 182, 215, 588, 1185
 piezoelectric fields 1179
 – scattering carriers 679
 piezoelectric material 948
 piezoelectric polarization 157, 236, 259, 263, 289
 – calculation 259
 – effects 132
 – non linearities 256
 – properties 62
 – transducer 1120
 piezoelectric tensor 237
 piezo-induced polarization 278
 pillarlike interfacial layer 327
 pin photodiodes 661
 planar defects 844
 plane wave expansion method 134
 plane wave pseudopotential (PWPP) 78
 Plank's constant 942
 plasma-assisted MBE (PAMBE) 428, 657
 plasma-assisted OMVPE 636
 plasma-enhanced CVD 394
 plasma excitation 513
 plastic deformation 327
 plastic relaxation 483
 PL bands 1061
 PL emission 1161
 PLE spectrum 1056

- PL intensity 1055
 - PL spectra 1056
 - PL transition 1054
 - point defects theory 919
 - Poisson effect 155
 - Poisson equation 270
 - Poisson ratio 484, 565
 - Poisson's equation 266, 269, 271
 - Poisson's ratio 37, 38, 158, 292, 483, 826
 - polarization charge 221, 267, 276, 1173
 - Ga-polarity single AlGa_N/GaN interface 272
 - Ga-polarity single Al_xIn_{1-x}N/GaN Interface 276
 - polarization charge density 266
 - polarization difference 284
 - polarization effects 131, 230
 - polarization gradient 269
 - polarization-induced charge 221, 286, 287, 288, 615
 - polarization-induced electric field 282, 622, 626
 - polarization-induced field 283, 753
 - polarization-induced interface charge 266
 - polarization-induced interface sheet density 286
 - polarization-induced red shift 288
 - polarization-induced surface 266
 - polarization in heterostructures 264
 - polarization in quantum wells 278
 - nonlinear 280
 - polarization vector 1115
 - polarized light 1109, 1110, 1119, 1176, 1177
 - polarized light emission 1173, 1178, 1179
 - polycrystalline film 600
 - polycrystalline growth mode 630
 - polymeric GaN 731
 - polymeric product 399
 - Poole-Frenkel barrier 954
 - Poole-Frenkel effect 939, 945, 947, 948, 950, 955, 972, 973
 - porous SiC (PSiC) substrates 503
 - porous silicon (PS) 509
 - positive polarization charge 273
 - positron annihilation experiments 982, 983, 984, 992
 - positron annihilation spectroscopy (PAS) 933
 - positron-electron momentum distribution 982
 - positron lifetime experiments 983, 989
 - positron lifetime spectroscopy 995
 - positron's wave function 1038
 - postgrowth annealing 109, 110, 993
 - postgrowth evaluation 503
 - postimplant annealing treatment 1163
 - powder technique 77
 - Powell's model 441
 - precursor-mediated model 449
 - precursor-mediated pathway 438
 - precursor flux 400
 - predigital thermometers 296
 - pre-epitaxy surface preparation 334
 - preexponential factor 399
 - pressure coefficient 14
 - prismatic growth 516
 - prismatic planes 533, 568
 - probe-size-related effect 620
 - process pressure 525
 - proton implantation 1190
 - proton irradiation 963
 - pseudo-hydrogen atoms 649
 - pseudomorphic temperature 631
 - pseudopotential calculations 138, 139
 - pseudopotential method 132, 135
 - pseudopotential plane wave calculations 42
 - pseudopotential plane wave method 38
 - p*-type doping 1006, 1007, 1013, 1035
 - role of hydrogen 1034
 - p*-type doping with superlattices 1032
 - p*-type GaN 627, 1163
 - p*-type semiconductor 272
 - p*-type impurity atoms 92
 - pulsed laser ablation/chemical vapor deposition (PLA-CVD) process 739
 - pulsed positron beam 991
 - pyramidal planar defects 818
 - pyramidal structures 559
 - pyroelectric effects 1185
 - pyrolysis temperatures 512
 - pyrolytic decomposition 653
 - pyrolytic process 653
- q**
- QD-like structures 722
 - quadratic equation 103
 - quadratic nonlinearity 280
 - quadrupole mass spectrometer 51
 - quantitative *in situ* method 401
 - quantum-confined Stark effect(QCSE) 264, 286, 611616
 - quantum dots 706, 707, 711, 723
 - colloidal formation 723
 - growth 706
 - holy grail 707
 - quantum dots by MBE 712
 - quantum dots by OMVPE 719
 - quantum efficiency 612
 - quantum mechanical treatments 1065

- quantum mechanics 218
 quantum size effect 186
 quantum well (QW) structures 90, 132, 213, 221, 215, 279, 280, 673, 706, 1125, 1149, 1179
 – thickness 222
 quasi-cubic approximation 166, 167, 174
 quasi-cubic model 160, 168, 171, 179, 182
 quasi-Fermi level 197
 quasi-linear temperature gradient 361
 quasi-particle approach 141
 quasi-particle band structure energies 141
 quasi-particle excitations 139
 quaternary
 – InGaAlN 699
 quaternary alloys 89, 100, 699, 652
 – growth of 652
- r**
- radiation-induced defects 190
 radiative recombination lifetime 573
 radiative transitions 196, 1177
 radio frequency plasma excited (RF-MBE) 98, 405, 630
 Raman-active optical phonon modes 64
 Raman frequencies 559
 Raman measurements 483
 Raman mode 39, 563
 Raman scattering 40, 613, 695
 – data 559
 – experiments 193, 561
 – measurements 61, 64
 Raman spectroscopy 42, 79, 563
 – measurements 563
 Ramsdel notation 2-4
 Rare earths 1046
 Rashba coupling 1173
 – mechanism 1186
 Rashba–Sheka–Pikus (RSP) 214
 Rashba spin–orbit coupling effect 1169
 Rashba spin splitting 1186
 RBS-channeling 1161
 reactive ion etching (RIE) methods 511, 751, 966
 reactive ion molecular beam epitaxy (RIMBE) 72, 435, 441
 reactive molecular beam epitaxy (RMBE) 326, 963
 rectangular cross section facet 533
 reduced recombination efficiency 612
 reduced screw dislocations 586
 reflectance spectra 177, 1135
 reflectance spectroscopy 84
 reflection high-energy electron diffraction (RHEED) 6, 341, 417
 – intensity 700
 – patterns 633
 – secular beam 700
 refractive index 27, 32, 34, 73, 74, 89, 1120
 relative transition probabilities 1114
 RF-activated nitrogen 405
 RF magnetron sputtering (RF MS) 98, 637, 638
 RF plasma-assisted MBE 993
 RF plasma source 452
 RF-sputtered film 187
 RKKY theories 1187
 RKKY-type interactions 1090
 reactive molecular beam epitaxy (RMBE) 436, 437
 RMBE-grown films 1039
 rock salt 1, 2, 14, 28, 36, 62
 room-temperature absorption coefficient 73
 room-temperature electron mobility 87
 room-temperature ferromagnetic semiconductors 1134
 room-temperature Hall measurements 605
 room-temperature thermal conductivity 59
 root mean square (rms) 196, 346
r-plane sapphire 293, 326, 373, 377
 Russel–Saunders coupling 1046
 Rutherford backscattering spectrometry (RBS) 91, 187, 188, 700, 704, 1162
 – experiment 1037
- s**
- sacrificial buffer layers 469
 Samsung Advanced Institute of Technology 468
 Samsung freestanding template 1003
 Samsung template 477, 1002, 1003
 sandwich method 392
 Sapphire 342, 343, 344, 346, 388, 452, 512, 709
 – stacking order 351
 – surface preparation 346
 – unit cell 344
 sapphire planes 372
 sapphire substrates 72, 87, 293, 327, 382, 665, 752
 satellite spots 646
 saturation magnetization 1066
 scanning capacitance microscopy (SCM) 910
 scanning electron microscope (SEM) 978
 – images 445
 scanning thermal microscopy (SThM) 57

- scanning transmission electron microscope (STEM) 836
- scanning tunneling microscopy (STM) 412, 588, 642, 691
 - probes 691
- scanning tunneling spectroscopy (STS) 367
- scattering amplitude 422
- Schmidt orthogonalization condition 135
- Schoenflies notation 2
- Schottky barrier 271, 621
 - ultraviolet detectors 508
- Schottky characteristics 575
- Schrodinger–Poisson equations 265, 282
- Schrodinger–Poisson solver 272, 281
- Schrodinger's equation 136, 266, 215, 219, 270, 420
- screw burgers vectors 836
- screw dislocation(s) 336, 550, 571, 823, 826, 828
 - component 488
 - full core 831, 865
 - open core 831, 865
- screening field 244
- s–d exchange interaction 1117, 1126
- SdH measurements 1186
- secondary ion mass spectroscopy (SIMS) 91, 475, 985
- second lithographic process 551
- second-order elastic moduli 78
- second-order perturbation theory 160, 172
- Se doping electron concentrations 1012
- segmented silicon lattice planes 567
- selected area diffraction (SAD) 668
- selective area epitaxy (SAE) 535
- selective area growth (SAG) 583
- selective epitaxial growth 529, 537
- self-catalytic process 731
- self catalytic vapor–liquid–solid (VLS) process 730
- self-compensation process 1005
- self-consistent field method 137
- semiconductor-ferromagnetic material interface 1169
- semiconductor lasers 216
- semiconductor quantum dots (QDs) 706
- semiconductors 369
- semiconductor substrates 330
- semiconductor technology 1006
- semiempirical pseudopotential calculations 199
- semi-insulating SiC 336
- semi-insulating (SI) GaN 1044
- semimetallic overlap 205
- seven-atom ring core 837
- shallow acceptors 1010, 1017
- shallow donor acceptor 507
- shallow donors 1007
- sharper superimposed peak 522
- sheet carrier concentration 268, 287
- sheet carrier density 278, 653
- short-range electron-hole spin exchange interaction 1149
- Shubnikov-de Haas data 169
- Shubnikov-de Haas measurements 169
- Si 332
 - surface preparation 333
- Si-based electronics 507
- SiC 334, 335
 - epitaxial layers 503
 - hydrogen surface etching 340
 - stacking sequence 335
 - surface preparation 338
- SiC mechanical polishing techniques 479
- Si-doped GaN layer 585
- Si doping 1010
- silica-based fiber dispersion 110
- silicon-on-insulator (SOI) 509, 565
- silicon substrates 544
- SIMS 1005
- SIMS analyses 1041
- SIMS technique 475
- single-crystal AlN films 396
- single-crystal diffraction 462
- single-crystal epitaxial thin films 73
- single-crystalline AlN 638
- single crystalline GaN 624
- single-crystalline structure 741
- single-electron spin transistors 1123
- single-interface heterostructures 276
- single magnetic ion interaction 1084
- single-molecule precursors (SMPs) 740
- single quantum well (SQW) 286, 559
 - structure 286
- single-step ELO technology 535
- single-step substrate 496
- single-walled carbon nanotubes (SWCNs) 749
- Slater-Koster parameters 141
- SMB threading defect 498
- smooth coalesced films 558
- smooth surface morphologies 634
- solar-blind detectors 638, 652
- solar-blind region 492
- solar-blind UV photoconductors 661
- solar cells 211
- solid-liquid interface 729
- space group 143
- space grouping 2

- spatial modulation 1169
- sp-d exchange 1125
- sp-d exchange interaction 1127, 1129
- sp-d spin exchange interaction 1118, 1127
- specific heat 17, 25, 29, 31, 53, 60, 61, 67, 68, 79, 80, 81
- spectral position 998
- spectroscopic ellipsometry 170, 177, 288
- specular epitaxial films 523
- specular reflection spot 417
- sphalerite 2,4
- spin angular momentum 1072
- spin coherence length 1172
- spin coherence times 1134, 1168
- spin-dependent kinetic exchange interaction 1087
- spin-dependent transport 1077
- spin diffusion length 1184
- spin-down channel 1100
- spin-down electrons 1005, 1070, 1078, 1104, 1109
- spin-down states 1115, 1116
- spin exchange interaction 1085, 1117, 1137, 1147
- spin FETs 1171, 1188
- spin-freezing temperature 1144
- spin interaction induced 1077
- spin LED 1174
- spin LED structures 1179
- spin light-emitting diodes (spin LEDs) 1169
- spinoidal decomposition
 - InAlGaN 705
- spinoidal isotherms
 - InAlGaN 705
 - spin-orbit interactions 148
- spin-orbit splitting 152, 171
- spin ordering 1066
- spin orientation 1169, 1179
- spin polarization 1110, 1169, 1176, 1179, 1188
- spin-polarized carriers 1078, 1135
- spin-polarized current 1171
- spin-polarized electrons 1168, 1172, 1173, 1176, 1179
- spin-polarized holes 1135, 1176
- spin-polarized injection 1171
- spin-polarized tunneling (SPT) 1078
- spin-polarizing electrode 1169
- spin-orbit band 225
- spin-orbit coupling 1054, 1116, 1135, 1149, 1187
- spin-orbit interaction(s) 148, 151, 174, 1084, 1104, 1110, 1172, 1185
- spin-orbit interaction, *see* Jahn–Teller effect 999
- spin-orbit levels 1061
- spin-orbit split-off band coupling 215
- spin-orbit split-off bands 1110, 1115
- spin-orbit split-off band transitions 1114
- spin-orbit split-off-hole effective mass 175
- spin-orbit split-off mass 183, 201
- spin-orbit splitting 148, 151, 152, 160, 161, 172, 183
- spin resonant tunneling device 1076
- spin splitting 1126
- spin-splitting energies 1186
- spin transport electronics 1046, 1077
- spin tunnel junctions 1168, 1169
- spin-unpaired electrons 818, 1168
- spin-up channel 1100
- spin-up electron 1047, 1070, 1079
- spin valve 1180
- spin valve structure 1173
- spinel-type structure 611
- spinodal curves 698
- spinodal isotherms 705
- spinodal phase separation phenomenon 97
- spintronic devices 1168
- spintronics 1063
 - general remarks 1075
- spiral hillock features 459
- spiral hillocks 445, 460
- split-off band 1110
- split-off hole mass 152, 174
- spontaneous polarization 231, 241, 265, 277
 - charge density 266
 - charges 588
 - coefficients 132
 - nonlinearities 253
- sputtering technique 84, 637, 638
- squared absorption coefficient 96
- SQUID magnetometers 1167
- SQUID measurements 1158
- stacking-order mismatch 351
- stacking fault (SF) 818, 851
 - basal 853
 - electronic structure 884
 - induced by Mg doping 887
 - prismatic 860
 - type I and I1 852
 - type II and I2 852
 - type III 852
- stacking mismatch boundaries (SMB) 329, 818, 844
- stacking sequence 2,4,146
- stamping method 569
- standard framework 498
- standard liter per minute (slm) 467, 486
- stark effect 288

- stark shift 264, 288
 - steady-state capacitance 944
 - steady-state four-probe method 54, 59
 - step-flow growth 403
 - stick-and-ball representations 4, 846
 - sticking coefficients 400
 - STM data 642
 - stoichiometric boundary 633
 - stoichiometric growth 632
 - stoichiometric nitrides 131
 - stokes shift 170
 - strain-free films 328
 - strain-induced piezoelectric 277
 - strain-induced polarization 264
 - strain minimization 377
 - strain-relieving defects 260
 - strain–stress relationship 154
 - strained-layer superlattices (SLS) 213, 450
 - Stranski–Krastanov (SK) mode 415
 - stress
 - strain-GaN on SiC 483
 - stress-related phenomena 502
 - stress–strain relationship 155
 - stress–temperature coefficient 484
 - strong exchange interactions 1086
 - sublimation sandwich method (SSM) 392
 - submicron seed posts 541
 - substitutional acceptors 1007
 - substrate surface preparation 494
 - substrate temperature 299
 - superexchange interaction 1086
 - superexchange mechanism 1086
 - supersaturation 363
 - surface acoustic wave measurements 63
 - surface diffusion 413
 - length 404
 - surface energy 368
 - surface morphology 406, 455, 460, 845
 - surface-segregation processes 450
 - symmetry-conserving stress 42
- t**
- tandem shift 204
 - telecommunication purposes 110
 - TEM analyses 491
 - TEM bright-field images 656
 - TEM data 604
 - TEM diffraction images 1128
 - TEM images 1128
 - temperature controllers 296
 - temperature-dependent Boltzmann term 412
 - temperature-dependent CL spectra 178
 - temperature-dependent emission energy 170
 - temperature-dependent measurements 1042
 - temperature-dependent thermal
 - conductivity 55
 - temperature-independent constant 1073
 - temperature-independent electron 654
 - temperature-programmed desorption (TPD) 443
 - temperature resistivity measurements 1044
 - template-based methods 735
 - template-based techniques 737
 - tensile biaxial strain 262
 - tensile strain 658
 - tensile uniaxial strain 160
 - tentative growth mechanism 505
 - terahertz frequency optical switches 1076
 - ternary
 - alloys 89, 90, 210, 652, 1010, 1124
 - growth 652
 - terrace width 445
 - tetragonal unit cell 383
 - tetrahedral bonds 366
 - tetrahedral notation 852
 - theoretical frequency shifts 642
 - thermal activation 406
 - energy 1042
 - thermal annealing 521, 608, 1015
 - thermal conductivity 53, 59, 79, 499, 638
 - thermal cracking 436
 - thermal decomposition rate 453
 - thermal desorption spectroscopy (TDS)
 - technique 443
 - thermal emission 942
 - techniques 956
 - thermal energy 412
 - thermal etching 597
 - thermal expansion coefficients (TEC) 47, 67, 479, 537, 601, 658, 662
 - thermal imaging 57
 - thermally detected optical absorption (TDOA)
 - measurements 190
 - thermally stimulated current
 - spectroscopy 1041
 - thermal mismatch 290, 326
 - induced strain 290
 - thermal stability 396
 - thermal strain 510, 546
 - thermal stress 291, 297, 660
 - thermodynamic 436
 - thermodynamical data 388
 - thermodynamic equilibrium models 398, 451, 934
 - thermodynamical (low-stability) barriers 362, 392
 - thermogravimetric technique 398
 - thick single-crystalline GaN layers 386

- thick wurtzite GaN films 329
 threading dislocation (TD) 460, 473, 553, 586,
 656, 660, 662, 818, 822
 – densities 528, 585, 604
 three-dimensional (3D)
 – diagrams 100
 – growth 341
 – mechanisms 565
 – nucleation 544
 – strain-minimizing shape 568
 – stress relief 565
 threefold spot pattern 652
 three-step ELO process 557
 three-step growth 527
 tight binding (TB) approximation 133
 tight binding calculation 208
 tight-binding model 134, 499
 tight binding realm 272
 time-resolved luminescence 571
 time-resolved PL (TRPL) 279, 573
 time-resolved Raman measurements 39
 TiN nanoporous blocking method 577
 TM-doped GaN 1101, 1141, 1146
 total energy (TE) 820
 traditional compound semiconductors 205
 transient PL study 1054
 transient spectroscopy 462
 transition elements 1046, 1060, 1063, 1188
 transition energies 1187
 transition growth regime 455
 transition metal doped semiconductor 1153
 transition metal impurities 1046
 transition point 492
 translation domain boundaries (TDBs) 818,
 844
 transmission cross-sectional TEM 472, 529,
 565
 transmission electron microscopy
 (TEM) 565, 817
 – images 340, 684, 1128
 transmission measurements 635
 transverse acoustic (TA) mode 39
 transverse optical (TO) phonon
 frequencies 20
 trapezoidal crystals 516, 517
 trapezoidal stripes 556
 trenched substrates technique 659
 trialkyl compounds 409, 468, 513
 trialkyl precursors 467
 triangular stripes 531, 538, 563
 trichloroethane (TCE) 329
 triethylgallium (TEG) 393, 395, 530, 1005
 trigonal field splitting 1061
 trimetal Ga (TMG) 1015
 trimethylaluminum (TMA) 395
 trimethylgallium (TMG) 395, 467
 trimethylindium (TMI) 395
 truncated hexagonal features 523
 tunneling barrier 1182
 tunneling magnetoresistance (TMR)
 ratio 1078, 1182
 tunnel junction magnetic resistance
 (JMR) 1078
 two-boat system 738
 two-coupled conduction bands 203
 two-dimensional buffer material 328
 two-dimensional electron gas (2DEG) 586
 two-dimensional growth mode 415, 641
 two-dimensional imaging 839
 two-dimensional polarization 266
 two-dimensional stress 292
 two-dimensional version 419
 two-electron transitions 610, 1010
 two-state (binary) system 1076
 two-step ELO 551
 two-step epitaxial lateral overgrowth 547
- U**
- UHV electron cyclotron resonance (ECR) 638
 ultrahigh vacuum (UHV) 330
 ultraviolet detectors 652, 667
 ultraviolet LEDs 508
 ultraviolet photoemission spectroscopy
 (UPS) 69
 uniaxial stress 158, 373
 universal Kane's relation 194
 unpolarized light 1147
 UV-assisted atomic layer epitaxy 89
 UV emitters 666
 UV wavelengths 432
- V**
- vacancies
 – doping 983
 – growth kinetic and thermal behavior 993
 vacancy 928, 929
 – Ga 929
 – N 930
 vacancy-impurity complexes 931, 988
 vacancy-mediated self-diffusion 931
 vacancy-related lifetime components 992
 vacuum-deposition techniques 329
 valence band 224, 1164
 – confinement energies 226
 – density 1017
 – edge 173
 – heterojunction offsets 139
 – mass parameters 199

- valence band maximum (VBM) 207, 828
 - valence band offset 211, 215
 - valence band structures 143
 - valence electrons 983
 - valence force field (VFF) 680
 - van der Waals bonding 328
 - van der Waals epitaxy 328
 - van der Waals forces 411
 - van der Waals substrates 328
 - vapor–liquid–solid (VLS) process 726, 727
 - vapor–solid (VS) growth 726
 - vapor–solid method 732
 - vapor phase composition 387
 - vapor phase epitaxy (VPE) 385
 - vapor phase growth 726
 - vapor phase reactions 520
 - variable-range hopping regime 1163
 - Varshni formula 203, 1161
 - Varshni parameters 170, 177, 192
 - V-defects
 - induced by Mg doping 894, 895, 897
 - InGaN 674
 - InGaN quantum well 905
 - Vegard's law 85, 90, 94, 95
 - Verdet constant 1106
 - vertical cavity surface emitting laser (VCSEL) 110
 - vertical gradient freeze (VGF) methods 330
 - vibrating sample magnetometer (VSM) 1141
 - vibrational modes 39
 - Vinter notation 219
 - VLS process 729
 - void-assisted separation (VAS) process 576
 - Volmer–Weber (VW) mode 415
 - volume-conserving strain 284
 - V-shaped defect(s) 664, 666
 - V-type inversion domains 845
- w**
- Wafer bonding 471
 - wave pseudopotential methods 366
 - wave vector 420, 647
 - weak antilocalization (WAL) 1185
 - weak compressive strain 277
 - weak photoluminescence peaks 84
 - Weisbuch notation 219
 - well-characterized semiconductors 75
 - well-converged plane wave calculations 138
 - well-defined angular momentum 137
 - wet etching techniques 35
 - Wigner–Seitz cell 135
 - wurtzite (Wz) 1, 131, 1124
 - Wurtzite AlN, *see* bandgap semiconductor
 - wurtzite crystal structure 28, 39
 - Wurtzite GaN bandgap 169
 - Wurtzite nitride growth 498
 - wurtzite phase 508, 612
 - wurtzite semiconductors 213, 1109, 1149
 - wurtzite structure(s) 2, 7, 143, 144, 148, 844
 - wurtzitic crystals 162
 - wurtzitic InN 185
 - wurtzitic phase 381, 477
 - wurtzitic systems 410
- x**
- X-ray absorption spectroscopy (XAS) 38, 1053
 - X-ray analysis methods 521
 - X-ray beam 474, 619
 - X-ray data 33, 34, 78, 393, 474, 487, 489, 521, 687, 1150
 - X-ray diffraction (XRD) 10, 11, 37, 38, 64, 187, 188, 276, 364, 372, 462, 465, 487, 514, 528, 537, 588, 590, 605, 607, 608, 637, 695, 702, 1144, 1146, 1189
 - experiments 626
 - in and out of plane diffractions 466
 - peak 72, 91, 372, 463, 488, 519, 525, 570, 573, 581
 - spectra 188
 - spectral FWHM 636
 - system 475
 - X-ray linewidth 407, 446
 - X-ray photoelectron diffraction 587
 - X-ray photoelectron spectroscopy 208, 301, 349, 639
 - X-ray photoemission spectroscopy (XPS) 48, 1100
 - X-ray reciprocal-space mapping 95
 - X-ray reflections 608
 - X-ray rocking curve 98, 364, 365, 465, 466, 474, 510, 513, 514, 576, 601, 605, 619, 687, 688
 - analysis 636
 - peaks 522
 - X-rays 462, 463
 - techniques 67
 - wavelength 463
 - wave method 587
 - XRD analysis 77, 364, 489, 600, 687, 688
 - XRD rocking curves 474, 619, 620, 621
- y**
- yellow line (YL) emission 555
 - yellow luminescence 567, 886, 924, 926, 928, 982, 1000, 1056, 1198
 - YL band 563, 609, 1011, 1013, 1040, 1042

- Young's modulus 15, 16, 23, 24, 30, 33, 38, 63, 156, 157, 158, 291, 331, 333, 337, 345, 358, 483, 565, 566
- z**
- Zeeman effect 1129
- Zeeman splitting 1110, 1116, 1117, 1118, 1119, 1120, 1127, 1129, 1133, 1135, 1136, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1187
- Zener theor(ies) 1090, 1091, 1187
- zero-dimensional electronic systems 738
- zero-order quarter-wave plate 1176
- zero-phonon line (ZPL) 1000
- zero-phonon peak 1011, 1039
- zero-phonon transition 1039, 1042, 1043
- zinc blende 1, 2, 6, 9, 14, 16, 17, 21, 22, 24, 28, 29, 40, 41, 43, 45, 57, 63, 77, 78, 90, 98, 109, 131, 132, 136, 138, 140, 141, 171, 176, 183, 184, 201, 202, 232, 294, 466, 681, 723, 851, 854, 858, 930, 932, 1118
- AlN 24, 28, 29, 183
 - growth 507
 - phase 9, 14, 16, 17, 22, 23, 24, 36, 477
 - polytypes 36, 41, 62, 82, 90
 - structure 2, 4, 39, 141, 143, 144, 1096, 1124
 - symmetry 1117
- zinc blende GaN 172
- zinc blende InN 200
- Zn-doped samples 628
- ZnO 350, 351
- surface preparation 353
- ZnO substrates 598
- ZPL 1045

