

Index

- III-V semiconductors 518
 II-VI semiconductor 519
 7×7 reconstruction on Si (111)
 surface 340, 447

 α -Fe₂O₃ nanoparticles 108, 111
 absorption and emission spectroscopy
 452
 accommodation coefficient
 148–150, 152, 155, 165, 168
 active surfactant 269
 adsorbing polymer 52, 56
 adsorption isotherm 450
 adsorption limited process 149
 aerogel 320, 347, 535, 537
 aerosol 62, 121–124, 254, 256
 aerosol-assisted CVD or AACVD
 254
 AES 243, 457, 458, 460, 461
 AFM 8, 15, 211, 369, 389, 523
 AFM based nanolithography 404
 Ag nanoparticles 79, 113
 agglomeration 13, 21, 29, 38, 45,
 62, 86, 213, 348, 537
 aligned carbon nanotubes 304–307
 alkanethiols 270, 271, 273–275
 alkylsilanes 270, 271, 273
 all-optical computer 542
 alternating layer deposition 264

 amphiphilic molecules 277, 278
 amphoteric surfactants 309
 anchored polymer 52, 53, 56
 anionic surfactants 309
 anisotropic growth 4, 14, 145, 160
 anode 76, 80, 108, 179, 187, 188,
 199, 200, 245, 347, 391, 422, 514,
 532
 anodic oxidation 143, 183, 320, 400
 anodized alumina membrane 183
 anti-Stokes scattering 457
 antibodies 514, 515
 aprotic solvent 51
 arc discharge 178, 299, 303
 arc evaporation 243, 303
 atomic force microscopy (AFM) 8,
 15, 369, 386, 434
 atomic layer CVD (ALCVD) 260
 atomic layer deposition (ALD) 3,
 229, 260
 atomic layer epitaxy (ALE) 260
 atomic layer growth (ALG) 260
 Au₅₅ clusters 512
 Au nanoparticles 4, 7, 81, 215, 512,
 516
 Auger electron 442, 458, 459
 Auger electron spectroscopy (AES)
 243, 457
 avalanche photodiodes 519

- β -FeO(OH) nanoparticles 111
- ballistic conduction 483, 488
- bandgap engineering 127, 266, 518
- barium titanate 200, 464
- base growth 306, 307
- basic memory 511
- BaTiO₃ 105, 121, 162, 200, 263, 467
- BaTiO₃ nanowires 161, 163
- BCF theory 151
- Bessel function 415
- Bi nanowires 206, 488
- biological cell electrodes 308
- biomaterial 106, 350, 353, 354
- biotin-avidin linkage 515
- block copolymers 313
- block polymers 52, 122
- blue/green lasers 519
- blue/green light-emitting diodes 519
- bottom-up approaches 4, 61, 369
- Bragg's law 435
- Brownian motion 40, 43, 46, 50, 196
- buckminster fullerene 298
- buckyball 298, 513
- C₆₀ molecule 298
- cantilever based sensors 522
- capacity 347–349, 449, 531–537
- capillary condensation 451
- capillary forces 267, 352, 390, 413, 447
- capping material 87, 93, 417
- carbon aerogels 324, 535
- carbon fibers 524
- carbon fullerenes 8, 14, 297
- carbon nanotube composites 347
- carbon nanotube transistors 511
- carbon nanotubes 2, 8, 143, 209, 297, 347, 418, 489, 526
- catalyst growth mechanism 305
- catalytic carbon filament growth 305
- cathode 80, 187, 188, 196, 199, 200, 202, 246, 283, 303, 346, 442, 526, 531
- cathode deposition 187, 303
- cathodoluminescence 454
- cationic surfactants 309
- CdS nanoparticles 100, 465
- CdSe nanoparticles 122, 127
- CdSe/CdS core/shell nanostructure 129
- CdSe/ZnS core/shell nanostructure 128
- CdTe nanoparticles 126
- Cd_xZn_{1-x}S nanoparticles 114
- centrifugation deposition 207
- ceramic processing 30, 59, 225
- charge determining ions 39, 40, 46, 197
- charge-exchange model 402
- chemical solution deposition (CSD) 229, 289
- chemical vapor deposition (CVD) 207, 229, 248, 384
- chemical vapor infiltration (CVI) 256, 347
- chemisorption 535
- citrate reduction 75, 78
- CMC 310
- Co film 486
- Co-ions or coions 39
- coating 92, 178, 284, 317, 371, 521
- coating thickness 284, 288
- colloidal dispersions 4, 50, 63, 75, 198, 433

- composition segregation 23, 25
- condensation reaction 103, 202, 312, 335
- conformal near field
 - photolithography 377
- constant current mode 389, 447
- constant voltage mode 389
- consumable templates 208
- contact-mode photolithography 373, 376
- controlled release of ions 108
- core-shell structure 14, 88, 127, 270, 333
- Coulomb blockade 490, 512
- Coulomb charging 483, 490
- Coulomb force 40
- Coulomb staircase 490
- counter ions 40, 196, 199
- covalently linked assembly 370, 418
- critical coating thickness 288
- critical energy barrier 67, 118
- critical micellar concentration (CMC) 277, 310
- critical nucleus size 230
- Cu nanoparticles 121
- Curie temperature 464, 495
- cycling performance 348, 349
- Czochraski crystal growth 167

- dc sputtering 246
- d-spacing 435
- de Broglie relationship 444
- de Broglie's wavelength 6
- Debye-Hückel screening strength 42
- deep Ultra-Violet lithography (DUV) 374
- defect scattering 484

- delivery of therapeutic agents 7, 513
- dendrimers 513
- depolarization field 494
- deprotonation 106
- diamond films 258, 260
- diffusion barrier 51, 74, 86, 94, 131, 343
- diffusion layer 42, 197
- diffusion-limited growth 51, 70, 80, 108
- dip-coating 284, 313
- dip-pen nanolithography 370, 411
- dipolar oscillation 473, 474
- discrete charging 490
- discrete electronic configuration 478, 490
- dislocations 151, 160, 233, 444, 462, 470, 483
- dislocation-diffusion theory 155
- dispersion interactions 416
- dissolution-condensation growth 159
- DLVO theory 45, 49
- DNA template 211
- DNA templating 211
- domain structures 495
- double layer structure 41, 197
- dye-sensitized solar cells 527
- dynamic force microscopy 450
- dynamic mode 523, 524
- dynamic SIMS 460

- effusion cells 244
- elastic modulus microscopy 450
- elastic scattering 442, 486, 488
- elastomeric stamp 405, 408
- elastoplasticity 472
- electric-field assisted assembly 370, 418

- electrical self-bias field 304
- electrically configurable switches 511
- electrochemical cell 80, 346, 353
- electrochemical deposition 80, 184, 207, 229, 267, 282, 538
- electrochemical etching 183, 543
- electrochemical methods 303
- electrochemical performance 348, 531, 532
- electrochemical vapor deposition (EVD) 256
- electrochemically induced sol-gel deposition 202, 203
- electrodeposition 184, 210, 351, 400, 532
- electrointercalation 346
- electroless deposition 191
- electroless electrolysis 191
- electrolysis 184, 193, 282, 538
- electrolytic cell 187, 188
- electromagnetic spectrum 455
- electron beam evaporation 243
- electron beam lithography 215, 369, 378, 411, 545
- electron cyclotron resonance (ECR) plasma 255
- electron density 436, 438, 441, 473
- electron field emission tips 308
- electron mean free path 477, 484, 488
- electron scattering 378, 445, 483
- electron tunneling 387, 446
- electrophoresis 197
- electrophoretic deposition 144, 196, 418
- electroplating 4, 144, 185, 381, 421
- electrospinning 14, 145, 213, 215
- electrostatic fiber processing 213
- electrostatic force 39, 50, 196, 270, 448
- electrostatic force microscopy 448
- electrostatic interaction 269, 276
- electrostatic repulsion 42, 45, 57, 415
- electrostatic stabilization 38, 46, 50, 88, 109, 197
- electrosteric stabilization 56
- emulsion polymerizations 123
- energy barrier 66, 118, 155, 230, 387, 394
- energy dispersive X-ray spectroscopy (EDS) 445
- entropic force 40
- enzyme immobilization 271
- epitaxial aggregation 329
- epitaxy 234
- equilibrium crystal 26, 153
- equilibrium vapor pressure 31, 148, 165, 241, 451
- Euler's theorem 299
- evanescent wave regime 392
- evanescent waves 392
- evaporation 7, 29, 100, 124, 144, 154, 164, 177, 229, 240, 286, 463
- evaporation-induced self-assembly 313, 343
- evaporation-condensation process 146
- excimer laser micromachining 370, 422
- excimer lasers 374
- extinction coefficient 475, 477
- extreme UV (EUV) lithography 374
- F-face 152
- far-field regime 392

- fatty acid monolayers 492
- Fe₃O₄ nanoparticles 126
- ferroelastic 495
- ferroelectrics 1, 15, 493
- ferroelectric-paraelectric transition 464, 494
- ferromagnetic 88, 211, 351, 496
- FIB deposition 383
- FIB etching 381
- field effect transistor (FET) 6, 511
- field emitters 524
- field evaporation 395, 400
- field-assisted diffusion 395
- field-gradient induced surface diffusion 402
- field-ion microscopy 400
- flat panel display 525
- flat surfaces 45, 152, 387
- flocculation 47, 95
- Flory-Huggins theta temperature 52
- flow sensors 308
- fluorescence 100, 454
- focused ion beam (FIB) 15, 381, 424, 511
- focused ion beam (FIB) lithography 369, 381
- forced hydrolysis 63, 106
- formation of cracks 287
- Fourier transform infrared spectroscopy (FTIR) 456
- Frank-van der Merwe growth 230
- Fraunhofer diffraction 375
- Fresnel diffraction 375
- Fuchs-Sondheimer theory 485
- fullerene crystals 298
- fullerene solids 297
- fullerenes 8, 14, 297
- fullerites 300
- GaAs nanoparticles 100, 111, 119
- GaAs nanowires 171, 180
- GaInP₂ nanoparticles 99
- Ga₂O₃ nanowires 157, 178
- galvanic cell 187
- GaN nanoparticles 101
- GaN nanowires 180, 488
- GaP nanowires 172
- gas adsorption isotherm 451, 498
- gas impingement flux 237
- gas phase hydrothermal crystallization 529
- Ge nanowires 169, 177, 207, 464
- gene replacement 513
- GeO₂ nanowires 179
- Gibbs-Thompson relation 34
- gold nanoparticle 7, 75, 211, 334, 353, 397, 419, 433, 473, 509, 545
- gold-silica core-shell structure 334
- good solvent 51, 95
- Gouy layer 41
- Grain boundary scattering 483
- graphene 300
- graphite 91, 120, 178, 230, 254, 297, 344, 534
- gravitational field assisted assembly 370, 419
- growth mechanism of zeolite 329
- growth steps 469
- growth termination 124
- growth-limited process 70
- Hall-Petch relationship 346, 470
- Hamaker constants 43
- Hamaker theory 416
- hardness 470
- heat mode 523
- helical nanostructures 157

- heterocondensation 104, 315
- heteroatoms 332
- heteroepitaxial growth 129, 161, 235, 521
- heteroepitaxy 232
- heterogeneous nucleation 14, 62, 116, 229
- heterojunction bipolar transistor (HBT) 8, 521
- heterojunction materials 527
- hexagonal faces 298
- hexagonal or cubic packing of cylindrical micelles 311
- hexagons 298
- hierarchically structured mesoporous materials 317
- high-resolution spectral filters 542
- highest occupied molecular orbital (HOMO) 453
- highly oriented pyrolytic graphite (HOPG) 119
- hollow metal tubules 191
- holographic lithography 543
- homoepitaxy 232
- homogeneous nucleation 62, 95, 128, 148, 168, 232, 248
- horizontal lifting 281
- Hückel equation 198
- hydrated antimony oxide 486
- hydrogen storage 15, 527, 535–537
- hydrogenation of unsaturated hydrocarbons 516
- hydrolysis reaction 78, 106, 262
- hydrophilicity 270
- hydrophobic interactions 413
- hydrophobicity 270
- hydrothermal growth 162
- hydrothermal synthesis 325
- hysteresis 498
- image-hump model 402
- imperfections 9, 146, 164, 373, 461
- imprint lithography 512
- impurity enrichment 23
- incident rate 237
- incorporation of organic components 324, 343
- indium tin oxide (ITO) 315, 525
- inelastic scattering 442, 484
- infrared (IR) spectroscopy 453
- InGaO₃(ZnO)₅ superlattice structure 266
- inhomogeneous strains 435
- InP nanocrystals 96, 480
- InP nanoparticles 96
- InP nanowires 174, 180, 482, 540
- intercalation methods 307
- intercalation compounds 344
- intermolecular conduction 493
- intramolecular conduction 493
- ion beam lithography 215, 369, 381
- ion bombardment 460, 525
- ion exchange 345
- ion implantation 347, 384
- ion plating 247
- ionic spectrometry 434, 460
- iron particles 497
- island (or Volmer-Weber) growth 118
- island-layer (or Stranski-Krastanov) growth 118
- Kelvin equation 35, 168, 451
- Kelvin probe microscopy 449
- Kinked surfaces (K-face) 152
- Knudsen cells 244
- Knudsen diffusion 257
- Knudsen number 238
- KSV theory 150

- laminar flow 238
- Langmuir films 278
- Langmuir-Blodgett films (LB films)
 - 13, 229, 277, 375
- Laplace equation 320
- laser ablation 172, 243, 303, 422
- laser direct writing 370, 420
- laser enhanced or assisted CVD
 - 254
- lasers 8, 374, 518, 542
- lattice mismatch 127, 232, 267
- layer (or Frank-van der Merwe)
 - growth 118, 230
- layer-by-layer growth 329
- layer-by-layer stacking 543
- layer-island growth 521
- leaching a phase separated glass
 - 320
- lead titanate 464
- Li-ion battery 351, 530
- LIGA 370, 421
- light emitting diodes 519, 542
- light forces 384
- liquid chromatography 300
- liquid metal ion (LMI) source 381
- lithography 4, 61, 145, 215, 369,
 - 512, 545
- local oxidation and passivation 400
- localized chemical vapor deposition
 - 400
- logic functions 511
- lowest unoccupied molecular orbital (LUMO) 453
- LPCVD (low pressure CVD) 254
- luminescence 127, 211, 454, 480,
 - 521
- macroporous 308, 350, 351, 353
- magnetic force microscopy 449
- magnetron sputtering 247
- Matthiessen's rule 483, 484
- MCM-41 311, 312, 318
- MCM-48 311, 312
- mean diffusion distance 149
- mean free path 236–238, 242, 244,
 - 251, 477, 478, 484, 486, 488
- mechanical properties 15, 35, 288,
 - 346, 461, 467, 470, 471, 499
- mechanical strength 323, 461, 468,
 - 469, 470, 525
- membrane-based synthesis 337
- mesopores 318, 348, 451, 498
- mesoporous 8, 13, 15, 183, 207,
 - 278, 289, 297, 304, 308, 309,
311–313, 315–320, 349, 358, 440,
509, 527–530, 535, 538
- mesoporous materials 8, 13, 15,
 - 183, 278, 289, 297, 308, 309,
311–313, 315, 317, 318, 320,
358, 440, 535
- metal alloy nanoparticles 88, 116
- metal catalyst 172, 258, 306
- metal nanoparticles 80, 87, 88, 96,
 - 119, 417, 419, 481, 482, 511, 544
- metal-to-semiconductor transition
 - 488
- metallic colloidal dispersions 75, 94
- metal-polymer core-shell structures
 - 336, 337
- micelles 2, 62, 121–123, 277,
 - 309–313
- microcontact printing 370, 405–408
- microemulsion 62, 121, 122, 157
- micromolding in capillaries 405,
 - 408
- microporous 308, 324
- microtransfer molding 405, 408
- Mie theory 475, 477

- Miller indices 26
mineralizing agent 325
MOCVD (metalorganic CVD)
254
molding 370, 405, 408, 421
molecular beam epitaxy (MBE) 4,
119, 229, 243
molecular density 237
molecular electronics 15, 510, 511,
512, 514
molecular electronics toolbox 512
molecular flow 238, 251
molecular labeling 516
molecular layer epitaxy (MLE)
260
molecular person 10, 12
molecular recognition 511, 514,
515
monolayers 3, 5, 6, 13, 14, 94, 229,
264, 269, 277, 333, 375, 406, 418,
492, 511
mononuclear growth 71
Moore's law 5
multipole oscillation 473
multi-wall carbon nanotube
(MWCNT) 300, 302

nano rings 157
nanobelts 155–158
nanobiotechnology 514
nanobots 7, 15, 513, 514
nanochannel array glass 183
nanocomposite 313, 347, 537–539
nanocomputers 511
nanocrystals 7, 15, 63, 91, 99, 100,
128, 161, 316, 438, 479, 513
nanoelectronics 510–512
nanograined materials 346, 347
nanoimprint 408, 410, 411
nanolithography 8, 14, 369, 386,
400, 412, 435, 522
nanomanipulation 8, 370, 386, 394,
396–399, 422, 522, 545
nanomechanical sensor 522
nanomedicine 7, 509, 513
nanoparticle seeding 88
nanoparticle superlattices 417
nanoparticles 3, 36, 57, 96, 125,
348, 463, 512, 545
nanorobots 2, 7, 513
nanoscience 3, 433
nanosensors 391, 522, 524
nanosurgery 513
nanotechnology 1–3, 5, 8, 10, 13,
183, 433–435, 445, 509, 512, 514,
546
nanotwizers 391, 522
nanowires 3, 14, 143, 154, 174,
202, 225, 418, 469, 539
nanowires of the III-V materials
171
near-field coupling 545
near-field photolithography 215,
377
near-field regime 392
near-field scanning optical
microscopy 369, 386, 391, 450
negative differential resistance 511
Nernst equation 38, 39, 185, 187,
282
neutral atomic beam lithography
369, 384
Nickel (Ni) nanoparticles 119
noble metal nanoparticles 544
nonadsorbing polymer 52
nonoxide semiconductor
nanoparticles 93
nonionic surfactants 309

- NSOM 369, 391, 392, 450
numerical aperture 374, 442, 443
- oligonucleotides 514, 515
optical absorption 95, 97, 453–456,
461, 474, 475, 480
optical labeling 514
optical switching and logic devices
519
ordered mesoporous complex metal
oxides 313, 315
ordered mesoporous materials 8,
13, 15, 278, 289, 297, 308, 309,
311, 313, 317
order-disorder transition 282
organic aerogels 271, 322, 324
organic-inorganic hybrid fibers 213
organic-inorganic hybrid zeolites 333
organic-inorganic hybrids 105, 200,
288, 339, 341, 343, 347
organometallic vapor phase epitaxy
(OMVPE) 255
organosilicon derivatives 270
organosulfur compound 273
ormocers 339
ormosils 339
oscillation 176, 384, 450, 455,
473–475, 477, 478, 489, 545
osmotic flow 48, 49
Ostwald ripening 13, 29–31, 34–38,
78, 93, 96, 102, 108, 131, 161
oxidation of carbon monoxide 516
oxidation of hydrocarbons 516
oxide nanoparticles 74, 102, 106,
110, 121, 125, 126, 339, 540
oxide-polymer nanostructures 338
- parallel process 394, 395
paramagnetic 90, 496
PbS nanoparticles 100
PbTiO₃ 464
Pd nanoparticles 121
PECVD 247, 254, 303, 307
pentagonal faces 298
pentagons 299
periodic bond chain (PBC) theory
150
perpendicular processes 394
phase masks 375, 376
phase shifters 375
phase-shifting photolithograph 375,
377
phosphorescence 455
photoactive polymer 371
photochemical deposition 420
photoelectrochemical cells 15, 509,
527
photolithography 215, 369, 371,
373–377, 386, 391, 394, 405
photoluminescence 211, 453–456,
482
photolytic deposition 420
photonic crystal 350, 351, 542–544
photonic bandgap 4, 276, 542, 543
photoresist 215, 219, 286, 371, 373,
375–377, 392
photovoltaic cells 527
physical adsorption 23, 25, 38, 53,
451, 452, 501
physical vapor deposition (PVD)
240
piezoelectrics 388, 390, 493
plasma enhanced chemical vapor
deposition (PECVD) 247
plasma etching 247, 273, 539
plasmon bandwidth 475–477
plasmon oscillation 473, 474, 477,
545

- plasmon waveguides 542, 544, 545
point of zero charge (p.z.c.) 39
polynuclear growth 71–74
polyheterocyclic fibris 493
polymer layers 53–56, 339, 410
polymer nanotubules 191
polymer particles 123, 124
polymer stabilizers 76, 79, 86–88, 93
polymeric stabilization 50, 51, 59
polymeric stabilizers 75
poor solvent 51, 52, 55, 56
pore volume 309, 318, 324, 327, 451, 501, 535
Porod's law 441
porous nanocrystalline TiO₂ 529
porous silicon 183
porous solids 308
powder metallurgy 30, 472
primary minimum 47
projection printing 371, 373, 375
protic solvent 51
proton conductivity 486, 487
proximity printing 37, 373, 379
Pt nanoparticles 78, 83, 87, 161, 162
pulsed electrodeposition 189
purification 13, 307, 462
pyroelectrics 493
pyrolysis 3, 62, 93, 101, 121, 126, 207, 213, 242, 248, 303, 307, 324, 534
pyrolysis growth 307
pyrolytic deposition 420
p-n injection diode 519
p-n junction materials 527
quantum dot heterostructures 521
quantum dot lasers 521
quantum dots 3, 4, 62, 63, 66, 112, 118, 121, 127, 434, 483, 521, 522
quantum resistors 308
quantum well electroabsorption and electro-optic modulators 519
quantum well infrared photodetectors 519
quantum well lasers 518
quantum wells 245, 518, 519, 521
radiation track-etched mica 183
radiation track-etched polymer membranes 183
radiation-track etching 320
Raman scattering 495
Raman spectroscopy 419, 453, 457
random doping fluctuations 12
rate of nucleation 67, 332
Rayleigh instability 464
Rayleigh scattering 457
Rayleigh's equation 373
reactive ion etching (RIE) 247
reactive sputtering 247
reduction of nitrogen oxides 516
reduction reagents 75, 76, 80–83
reflection high energy electron diffraction (RHEED) 243
relativistic effect 516, 517
replica molding 405, 408
repulsive barrier 46–48
residence time 148, 167, 247
resist 320, 324, 371–375, 378–381, 384, 392, 400, 405, 411
reversible spontaneous polarization 493
Reynolds number 239, 251
RF sputtering 245, 246, 531
Rh nanoparticles 77

- rough surface 167, 177
- roughening transition 27, 28, 177
- Rutherford backscattering spectrometry (RBS) 459
- scanning acoustic microscope 390
- scanning capacitance microscope 390
- scanning capacitance microscopy 449
- scanning electron microscopy (SEM) 386, 434, 441
- scanning probe microscopy (SPM) 8, 15, 386, 434, 445
- scanning probe tip 308, 527
- scanning thermal microscopy 449
- scanning tunneling microscopy (STM) 8, 15, 369, 386, 387, 434
- Schaefer's method 281
- Scherrer's formula 436
- Schottky barrier 395
- secondary ion mass spectrometry (SIMS) 460
- secondary minimum 47
- sedimentation method 419
- seeding nucleation 88
- selected-area diffraction (SAD) 445
- self-assembled multilayer 274
- self-assembled monolayer (SAM) 276
- self-assembly 2, 127, 211, 260, 270, 282, 289, 313, 317, 324, 333
- self-assembly of monodispersed spherical colloids 543
- self-limiting growth 260, 264
- self-purification 13, 462
- sensors 308, 353, 509–512, 523, 527
- shadow printing 371, 373, 375
- shear force assisted assembly 370, 417
- Si nanowires 170, 482, 488, 532, 534, 539
- silane coupling agents 293, 334, 363
- silica colloids 102, 421
- silica nanowires 179
- silicon pillars 543, 544
- single molecular electronics 514
- single molecular transistors 511
- single-wall carbon nanotube 301
- sintering 29–31, 35, 37, 61, 105, 126, 303, 321, 346, 529
- SiO₂ nanoparticles 340
- size-selective precipitation 95–97
- sliding process 395
- slip casting 205
- slip plane 41, 198
- small angle X-ray scattering (SAXS) 15, 436
- NaCl whisker 470
- soft lithography 15, 370, 405, 422
- soft organic elastomeric polymers 377
- sol-gel processing 63, 102–105, 114, 126, 198, 267, 311, 346, 534
- solar cells 289, 527
- solution filling 144, 206
- solution-liquid-solid (SLS) growth 180
- solvent exchange 322, 324
- specific surface area 19, 248, 318, 324, 451, 535
- specular scattering 484
- spin-coating 286
- spiral growth 151, 152

- SPM 8, 15, 386, 390, 391, 398–400, 422, 434, 445–450, 498, 524
- SPM-based nanolithography 400
- spontaneous growth 131, 144, 145, 146, 276
- spontaneous magnetization 498
- sputtering 119, 210, 229, 238, 240, 245–248, 381, 447, 460, 531
- static mode 523
- static SIMS 460
- step-growth theory 150
- stepped surfaces (S-face) 152
- steric stabilization 38, 50, 51, 55–57
- Stern layer 41, 42, 197
- STM 8, 15, 215, 369, 386, 388, 395, 399, 404, 423, 434, 447, 490, 517
- Stöber method 335
- Stokes scattering 457
- strain energy 232, 235
- Stranski-Krastanov growth 118, 521
- stress-induced recrystallization 144, 183
- structure-directing agent 325, 329–333
- subsequent growth 37, 51, 62, 68, 73, 80, 96, 108, 112, 131, 230, 329
- subsequent polymerization 338
- supercritical drying 320, 322–324
- supercritical point 322, 323
- superlattice 265–267, 282, 417, 539
- superparamagnetics 496
- superparamagnetism 15, 496, 498, 499
- supersaturation 62–64, 66, 67, 69, 83, 93, 106, 128, 147, 168, 182, 230, 469
- surface adsorption 23
- surface atomic density 22
- surface charge density 38, 39, 42, 46, 50, 185, 198
- surface diffusion coefficient 149
- surface energy 1, 21, 37, 153, 172, 233, 309, 346, 461, 499
- surface growth limited process 148, 149
- surface plasmon resonance 461, 473, 474, 478, 544
- surface potential 39, 402, 403
- surface relaxation 22–24, 184
- surface restructuring 22–24, 37
- surface roughening 28, 29
- surface scattering 9, 461, 477, 483–486, 499
- surfactants 13, 25, 100, 122, 161, 308, 309, 311, 315, 415
- SWCNT 300
- template 4, 14, 62, 121, 145, 184, 201, 210, 351, 382, 420, 539
- template filling 204, 205, 207
- template-assisted assembly 370, 419, 420
- template-based electrodeposition 194, 532
- template-directed reaction 208
- temporally discrete nucleation 93, 96
- thermal CVD 307
- thermochemical deposition 420
- thermoelectric 15, 193, 538–540
- thermometers 512
- thermoplastic polymer 409
- theta state 52
- thiol-gold bonds 515
- thiol-stabilized gold nanoparticles 517

- Thompson model 485
TiO₂ film 529
TiO₂ nanorods 203–205
TiO₂ particles 124, 203
tip growth 306, 307
tissue regeneration 513
TO₄ tetrahedra 324, 325
top-down approaches 8, 9, 422
transistors 5, 6, 8, 490, 511, 512, 542, 551
transition metal catalysts 258, 306
transmission electron microscopy (TEM) 8, 386, 444
tunneling conduction 488, 491, 492
tunneling junctions 511
turbulent flow 238, 239
twinned structure 436, 463
two-photon polymerization 10
- uniform elastic strain 435
- van der Waals attraction force 38, 43
vapor-liquid-solid (VLS) growth 3
vapor phase deposition 229, 264, 267, 333
vapor-solid (VS) process 146
vertical deposition 279, 280
vibrational frequency of adatom 149
vibrational spectroscopy 452, 453
viologen 512
viscous flow 29, 30, 238, 239
visible light scattering 441
VLS growth 3, 164–167, 170, 172, 177, 178, 305
Volmer-Weber growth 118, 230, 231
- waveguides 542–545
Wulff plot 26, 28, 153
Wulff relationship 463
- X-ray diffraction (XRD) 15, 434, 435
X-ray fluorescence 454
X-ray lithography 215, 369, 379, 381, 382
X-ray photoelectron spectroscopy 128, 457
xerogel 308, 320
- Y₂O₃ nanoparticles 126
Y₂O₃:Eu nanoparticles 109
yield strength 470, 471
Young's equation 117, 118, 230–232
Young-Laplace equation 33
- zeolites 183, 324
zero-point charge (z.p.c.) 39
zeta potential 198–200, 225
ZnO nanoparticles 109, 200
ZnO nanowires 178, 210, 540
ZnS film 260, 262
ZnS nanoparticles 127
ZrO₂ nanoparticles 125