

Index

a

- Abbe condenser, 434
- absorption, 15, 220
 - amplification coefficient, 149
 - coefficient, 147
 - gratings, 145
 - loss, 35, 41
 - phenomenon, 431
 - spectrum, 387
 - TC nanofiber, fluorescence spectra of, 67
 - type polarizer, 251
- acoustic sensors, 445
- additive manufacturing, 384, 397, 528
- adiabatic switching, 44
- ADSL. *see* asymmetric digital subscriber line
- advanced optical communication techniques, 314–318
- aeronautics, 384
- aerospace applications, fiber optic liquid-level sensor system
 - liquid-vapor (L-V) interface sensing devices, 471
 - optical fiber-based systems, 471
- Ag-Au alloy NPs, 239
- Ag NPs, 239
- Ag/SiO₂/sub/Pd MIM structure, 459
- Al color filters, 83
 - with nanoslits, 85
 - Plan-view SEM image and optical microscope image, 90
 - Polarization dependence of transmission spectra, 85
 - transmission spectra of, 84
- Al films, 82
- Al filters
 - polarization dependence of transmission spectra, 92
- AlGaAs thin film, 39
- 1-allyl-3-butylimidazolium bromide (ABImBr), 501
- Al_{sub}2/subO_{sub}3/sub film, 284
- aluminum (Al), 81, 126
- aluminum color filters
 - plan-view SEM image, 88
 - transmission spectra of, 84
- aluminum electrode, 337
- aluminum filters
 - optical microscope images of, 91
- amplification modes, 15, 220
- amplification noise addition, 322
- amplified spontaneous emission, 313
- amplitude, 38
 - coefficients, 335
 - growth, 155
 - modulations, 145
- amplitude-to-phase coupling, 310
- AMZI as a channel drop filter, 71
- analytic expressions, 148
- analytic solution
 - for first three Bragg orders for a balanced PT-symmetric grating, 174
- angle of diffraction, 176
- angle of incidence (AOI), 144, 158
- angle of linear polarization, 110
- angle of refraction, 158
- angular bandwidth, 143, 152
- angular Bragg conditions, 153
- angular difference, 116
- angular frequency, 31, 35
- angular momentum conservation law, 103
- angular spectrum, 143
- anisotropic
 - adatom diffusion, 108
 - dots, 108
- annealing, 361
- anticrossed exciton-polariton dispersion curves, 69

- antiparallel configuration, 116
 - antipodal signals, 317
 - antireflection coatings, 311, 337
 - antireflection techniques, 334
 - antisticking layer, 271
 - anti-Stokes intensity, 356
 - areal density, 128
 - arsenic (As), 126
 - artificially controlled plasmonic nanostructures, 269
 - ASE. *see* amplified spontaneous emission
 - associated efficiency model, 143
 - asymmetric configurations, 168
 - asymmetric digital subscriber line, 320
 - asymmetric Mach-Zehnder interferometer (AMZI), 70
 - asymmetric slab configurations, 168
 - light incident from
 - – air, 14, 170
 - – substrate side, 14, 168
 - reflective setup, 170
 - asymmetry coefficient, 161
 - asymmetry, of PT-symmetric grating, 172
 - atmospheric turbulence, 294
 - atomic cascade, 104
 - atomic configurations, 130
 - atomic force microscope (AFM), 66, 109
 - image of GaAs QDs, 39
 - atomic layer deposition (ALD), 284
 - Au-Ag NPs, 239
 - Auger generation, 346
 - Au nanorod, 235
 - surface via a polymer spacer, 236
 - Au nanoshell, 241
 - Au NP-doped nanofibers, 240
 - Au NP-Si QDs nanocomposite, 234
 - Au shell-protected Si QDs, 236
 - Au/SOI/BOX multilayer structure without any hole
 - calculated R spectrum, 279
 - Au/SOI/buried oxide (BOX) multilayer structure
 - without any holes, 279
 - average absorption, 148
 - average index, 148
 - average refractive index
 - in grating area, 194
 - axicons, 393
 - azimuth-angle dependence, 118
- b**
- Babinet's principle, 279
 - balanced phase, 14, 148
 - balanced PT-symmetric grating, 162, 176, 189
 - in paraxial approximation, 172
 - band gaps, 33, 341, 343
 - band index, 34, 42
 - bandpass filter, 431
 - band wavelengths, 31
 - bandwidth resource, 298
 - bare homogeneous slab, 338
 - basic ultrafine-grain emulsion, fabrication of, 409
 - coating, 412
 - concentration and removal of reaction by-products, 411
 - gelatin concentration, 410
 - jetting methods and jetting time, 410
 - silver and halide concentrations, 410
 - silver to halide ratio, 410
 - solution temperatures, 411
 - Bay Tree Egg, 420
 - beam shaping, 385
 - approaches, 387
 - beam-steering element, 99
 - Bell's inequality
 - violation of, 115
 - bending loss, 65
 - BER. *see* bit error rate
 - Bessel beams, 388
 - generation
 - – axicon component, using by, 388
 - Bessel functions, 150, 297, 363, 365
 - theory, 364
 - Bessel-type differential equation, 363
 - biexciton, 105
 - binding energy, 105
 - state, 104
 - bimetallic (Au-Ag) composite NPs, 239
 - binary phase-shift keying, 317
 - biophotonics, 233, 243
 - biotech, 384
 - 1,2-bis[2-methylbenzo[b]thiophen-3-yl]-3,3,4,4,5,5-hexafluoro-1-cyclopentene (BMTH), 498
 - bit error rate, 314
 - bit-rate limitations, 301
 - blackbody thermal emission, 31, 282
 - blood-brain barrier, 373
 - body-centered cubic (bcc), 507
 - Boeing airplane platform, 472
 - Boltzmann constant, 314
 - Boltzmann's constant, 31
 - Born approximation, 434
 - Born model, 434

- Bosch process with SF_{sub6/sub} and C_{sub4/sub}F_{sub8/sub} gases, 280
- Bose-Einstein distribution function, 51
- boundary conditions, 150, 160, 163, 164, 165, 177, 362, 363, 364
- generation, 366, 367
- BPSK. *see* binary phase-shift keying
- BPSK modulation
- signal constellation, 318
- Bragg angles, 152, 159, 162, 166, 171
- Bragg condition, 144, 149, 151, 159, 508, 512
- Bragg diffraction, 146, 148, 512, 522
- angle, 189
- Bragg diffraction peak, 516, 520, 522, 524
- shift, 524
- Bragg diffraction regimes, 151, 156
- intermediate and, 151
- Bragg functionality, 193
- Bragg grating, 193, 196, 210, 212, 216, 217, 219, 226, 227
- concatenation of, 14, 195
 - distributed mirror, 307
 - FP structure, 216
 - length, 212
 - manufacturing method, 215
 - mirror, 205, 214, 215, 307
 - reflection and transmission spectra, 199
 - temporal
 - characteristics, 202
 - response, 202, 203, 204, 205
 - transfer matrix equation, 210
- Bragg-reflected light changes, 520
- Bragg-reflecting crystalline lattice planes, 511
- Bragg reflection, 193
- band, 501
 - in visible wavelength range, 491
 - wavelengths, 513
- Bragg reflector, 219, 222, 226, 227, 343
- gratings, 215
 - structures, 15, 204
- Bragg regime, 147
- Bragg selectivity, 144
- Bragg wavelength, 456
- shift, 464
- brain-cell microenvironment, 373
- brain disorders, 372
- bright-field microscopy, 425
- Brillouin optical time domain analysis (BOTDA), 356
- effect of, 357
- Brillouin scattering, 356
- in optical fiber, effect of, 357
- brittle failure, 443
- Brownian motion, 517
- bulk physics, 114
- butterfly packaging, 314
- c**
- calcium, electronic ground state, 104
- calculated module of temperature gradients
- profile, in fiber, 372
- calculated temperature distribution in fiber, 372
- capacitive coupled plasma (CCP), 272
- capex reduction, 315
- capillary basal plane, 514
- carrier heating, 308
- carrier population temperature, 344
- carrier transport, 348
- cascaded amplifications
- noise in, 313
- cavity
- mode frequency, 49
 - transfer matrix, 217
- CCD camera, 281, 427
- CC gel film, 500, 503
- conceptual representation of tunable laser action, 502
 - light-emitting, 501
 - reflection
 - features of, 21, 493
 - spectra, 494
 - refractive index, 491
- CC hydrogel film, 500, 501
- CC laser cavity
- by optical excitation, 497
 - structure, 498
- cellular imaging, 243
- CH. *see* carrier heating
- channel capacity, 292
- charge-coupled device (CCD), 275
- detector, 111
- charge transfer induced formation
- of Si QD–Au core-shell composite NP system, 237
- chemical vapor deposition (CVD), 87, 495
- chemisorption sensors, 447
- CHF_{sub3/sub}-based RIE, 275
- chirping, 309
- chromatic dispersion, 431
- input to output pulse broadening, 300
- CIE 1931 test target, 416
- circular dichroism, 266
- circular dielectric rods, 35
- citrate acids, 237
- citrate-stabilized Au NPs, 234

- cladding, 448
- classical etching, 389
- Clauser-Horne-Shimony-Holt (CHSH), 117
- close-packed colloidal photonic crystal, 508
- coal consumption, 444
- coarse wavelength division multiplexing, 316
- coated opal films, 508
- CO₂/sub concentrations, 286
- coencapsulating Si QDs, 239
- coherent
 - detection, 316
 - optical communication, 316
 - optical receiver, 316
 - optical systems, 310
 - perfect absorber, 227
 - receiver, 294, 317
 - technology, 320
 - WDM, 319
- coincidence histograms
 - between, XX and X photons, 113
- cold cavity, 221
- cold optical cavity loss, 308
- colloidal crystal film, 515, 518
- colloidal crystal gel, 510, 520
- colloidal crystallization, 508, 516
 - schematic diagram, 509
- colloidal crystals (CC), 491, 492, 493
 - reflection spectra, 521
- colloidal microparticles, 493
 - synthesis of, 21, 493
- colloidal nanocomposites, 233
- colloidal particles
 - evaporative self-assembly of, 515
 - schematic diagram of concentrated crystallization, 517
- colloidal photonic crystal, 507, 510
 - elastomer, 519, 521
 - close-packed particles, 515
 - rubber sheet, 518
 - uniaxially oriented opal film by crystal growth, 21, 515
 - film, coating apparatus, 518
 - nonclose-packed, 508
- colloidal photonic crystal gel, 511, 520
 - nonclose-packed particles, 508
 - by shear-flow effect, 508
 - structural characterization of, 21, 510
- colloidal photonic crystals, 507, 521
 - nanoparticles, 507
 - structural characterizations, 514
- colloidal solution, 234
- colloidal stability, 236
- color and wavelength division multiplexing
 - management, 315
- color hologram of CIE 1931 test
 - target on a SilverCross plate, 416
- color holography, 404
 - recording museum artifacts with, 417
 - tests, 414
- colorless lasers, 321
- commercial optical component, 29
- comparative diffraction on index grating, 154
- complex amplitude, 148
- complex parity-time symmetric optics, 144
- computational domain, 371
- computational time costs, 361
- computer-controlled robotic methods, 528
- computer-generated hologram (CGH), 144
- concentration profile
 - calculated by using a PDE solver based on FEM, 375
 - comparison of, 379
- concentrator photovoltaic, 341
- condenser aperture diaphragm, 427
- conditional probability, one spin angles, 116
- conductive heat transport equation, 362
- conductive transfer, 360
- confocal laser scanning microscopy (CLSM), 436, 501
- constructive interference, 389
- contact angles, 397
- continuous wave, 316
 - diode-pumped solid-state laser, 281
- contour map, 136
 - of μ -PL intensity, 136
- contrast intensity, 431
- conventional dielectric waveguides, 65
- conventional light microscopy, 436
- conventional transmission microscopy, 425, 426
 - transmission microscopy, 19, 426
- conventional waveguides, 65
- cooling rate, 348
- core-shell cylinders, 389
- core-shell nanocomposite
 - formation, mechanism of, 237
- core-shell type nanocomposites, 234, 235
- CO₂/sub sensors, 283, 286
- Coulomb field, 126
- Coulomb interaction, 347
 - short-range part
 - long-range part, 106
 - term, 126
- coupled equation set, 159
- coupled wave equation, 149, 163

- coupling coefficients, 149, 195
- coupling constants, 158, 175
- cross-phase modulation, 304
- crystalline-silicon, 335
- crystalline suspensions, 509
- crystallization process, by optical microscope, 516
- cubic zinblende crystals, 108
 - structures, 108
- curing process, 461
- curved TC nanofiber
 - on a glass substrate, 79
- CW. *see* continuous wave
- CWDM. *see* coarse wavelength division multiplexing
- cylindrical geometry, 360
- cylindrical waves
 - for thermal infrared frequencies, 81
- d**
- dark fibers, 320
- dark-field microscopy, 428, 429
- 3D-arrayed PS colloidal particles with a face-centered cubic, fcc, structure, 519
- DBG FP resonator
 - lasing spectra, 225
 - with PT-SBG, 228
 - – grating, 222, 229
- DBHD. *see* double-balanced heterodyne detection
- DBR. *see* distributed Bragg reflector
- DBR/DFB Fabry-Perot structure, 195
- DBR FP resonator, 221
- DBR lasers, 15, 208, 209, 309
 - threshold condition, 208
 - for tuning purposes, 209
- DBR resonator, 214
- DBR structures, 193, 201
 - with PT-symmetric coupling, 212
 - reflection of, 223
- 3D cell structures
 - used in computations, schematic, 376
- DCF. *see* dispersion compensation fiber
- decay rate, 35, 37, 38, 133
- decay times, 133
- defect mode
 - frequency, 38, 39, 40
 - in a PC slab, 37
- defect structures, 37
- degree of coherence, 120
- degree of nonlocal correlation, 103
- degree-of-polarization, 112
- degree of state mixedness, 120
- deionized (DI), 236
- delta function, 35, 36
- demultiplexer, 315
- DEMUX. *see* demultiplexer
- dense wavelength division multiplexing, 316
- density matrix, 118
 - mathematical reconstruction of, 119
- density of states (DOS), 61
 - uniform material, 45
- dephases light rays, 431
- deposition thickness, 392
- DFB. *see* distributed feedback
- DFB/DBR structures, 200, 216
- DFB lasers, 193, 194, 215
- DFB-like structures, 201
- DFB structures, 193
- diameter drillings, 393
- diamond, 125
 - lattice, 32, 33
- dielectric
 - cladding, 295
 - guiding mechanism, 296
 - layer, 30, 335
 - microbead, 389
 - permittivity, 174, 386
 - rod, 35
 - spheres, 32
 - structure, 35
 - unit cells, 32, 33
 - waveguides, 68
- dielectric constant, 42, 76, 126
 - modulation, 148
- diffracted rays, 431
- diffraction asymmetry, 154
- diffraction coefficients, 165
- diffraction efficiencies, 153
 - in zero and higher diffraction orders by index grating, 151
- diffraction efficiency, 144, 150, 152, 156, 166, 167
 - expressions, 151
- diffraction order amplitudes, 154
- diffraction problem, 147
- diffraction spreading effect, 294
- diffractive and holographic microoptics
 - general classification of, 191
- diffractive optical element, 343
- diffusion, 372, 374
 - coefficient, 374
 - process, parameters evaluated by, 375
- diffusive mass transport
 - in brain tissues with applications to optical sensors, numerical analysis of, 372

- digital communication techniques, 17, 291, 318
 - digital communication theory, 291
 - digital holographic microscopy systems, 433
 - digital imaging technology, 404
 - digital reconstruction, 426
 - digital signal processing, 310
 - digital signal values, 292
 - digital subscriber line access multiplexer, 320
 - dimensionless coordinate, 159
 - dipole moment, 35, 38, 39
 - dipole radiation, 35, 38
 - enhancement factor of, 38
 - Dirac delta function, 34, 35, 43
 - direct detection receivers, 294
 - direct laser etching, 383
 - direct laser writing, 398
 - optical lithography, 398
 - Dirichlet-type boundary conditions, 362, 371
 - dispersion compensation fiber, 302
 - dispersion curves, of exciton-polaritons in TC film, 77
 - dispersion effect, 295
 - dispersion limitations, 302
 - dispersion management, 318
 - dispersion penalty, 309
 - dispersion relation, 33
 - dispersions as bit-rate limitations, 299–302
 - dispersion-shifted fiber, 302
 - dispersion time delay, 301
 - disruptive technological devices, 291
 - distributed Bragg reflector (DBR), 193, 307, 489
 - distributed feedback (DFB), 148, 193, 307, 489
 - distribution
 - of coincidence counts, 130
 - of electric field of defect mode, 36, 37
 - 3D metallic woodpile photonic crystals, 55
 - 3D Muse platform, 387
 - donor-acceptor pair transitions, 126
 - δ -doped GaAs:N
 - growth conditions and macro-PL, 134
 - growth conditions and “macro-PL”, 13
 - μ -PL of NNA and single-photon emission, 135
 - doping, 33
 - δ -doping technique, 125
 - double-balanced heterodyne detection, 317
 - double heterostructure, 306
 - downconversion, 339
 - principles, 339
 - downconverters, 340
 - downshifting principles, 339
 - 1D photonic crystals, 60
 - 2D photonic crystals, 57
 - 3D photonic crystals, 52, 492
 - 3D printing systems, 397
 - dry etching, 273
 - DSF. *see* dispersion-shifted fiber
 - DSLAM. *see* digital subscriber line access multiplexer
 - DSP. *see* digital signal processing
 - DVD technology, 527
 - DWDM. *see* dense wavelength division multiplexing
 - dynamic gratings, 13, 144
 - dynamic holograms, 144
- e**
- EB deposition, 273
 - EBL and RIE techniques, 271
 - ECL. *see* external cavity laser
 - edge emitting, 306
 - EE. *see* edge emitting
 - E-field distribution, 260
 - E-field vectors, 261
 - eigenfrequency, 34, 35, 36, 77
 - eigenfunction, 38, 42, 43
 - eigenvalues, 146
 - Einstein laws, 309
 - Einstein-Podolsky-Rosen (EPR) paradox, 116
 - Ekert protocol, 118
 - elastic photonic crystals, 521
 - electrical domain, 302
 - electrical polarization, 302
 - electrical spectral density, 314
 - electrical thermal noise, 314
 - electrical time domain multiplexing, 315
 - electric dipole (ED), 32
 - moment, 36
 - operator, 32
 - radiation, 33, 46
 - transition, 41
 - electric(E)-field vector
 - polarization, 249
 - electric field, 34, 160
 - inside grating region, 148
 - normalized, 158
 - electric/magnetic fields of resonance mode, 48
 - electric polarization, 33
 - electroabsorption modulation, 310
 - electromagnetic (EM), 269
 - coupling, 235
 - eigenmodes, 31, 34
 - energy, 34, 36
 - environment, 29

- field, 42
 - spectrum, 297
 - susceptibility, 386
 - theory, 38
 - waves, 32, 37, 173, 355
 - – interference, 65
 - electron beam (EB), 39
 - deposition, 273
 - electron beam lithography (EBL), 37, 252, 269
 - electron hole
 - exchange interaction, 136
 - pairs, 340, 344
 - recombination, 105
 - electronic, 287
 - band gap, 33, 346
 - circuits, 65
 - domains, 314
 - transition frequency, of the nanofiber, 76
 - electron-phonon interaction, 135
 - electro-optic modulation, 310
 - electrospinning process, 239
 - electrostatic attraction, 234
 - emission
 - intensity, 34
 - lines, 127
 - peak, 40
 - rate, 37
 - spectra, 281
 - – for s polarization, 286
 - spectra of GaAs QDs embedded in L3 cavities with, 40
 - spectrum stems, 496
 - wavelength, 314
 - emission-enhanced plasmonic metasurfaces,
 - fabricated by NIL, 278
 - fabrication and optical characterization
 - – of SC-PIC, 16, 279
 - emitted energy, 35
 - in a unit time, 45, 47
 - emitters, embedded in cavity were GaAs QDs, 39
 - energy efficiency, 60
 - energy scheme for, atomic cascade, 104
 - energy specification, 447
 - energy to gain medium, 385
 - energy transfer, 356
 - enhanced ED radiation, 46
 - enhancement factor, 39, 46, 48, 281
 - MD radiation, 48
 - of PL of composites, 234
 - entanglement of formation, 120
 - entropy, 292
 - equiwavelength heteroresonances, 279
 - erbium-doped fiber amplifier (EDFA), 155, 298, 311
 - etching profile quality, 388
 - ETDM. *see* electrical time domain multiplexing
 - European SilverCross emulsion project, 404
 - evanescent waves, 297
 - EW sensor, 456
 - excellent lateral resolution, 437
 - exciton (X), 105
 - exciton bound, 126
 - exciton peak energy, 132
 - exciton-polariton waveguiding, in TC nanofibers, 66
 - mechanism of active waveguiding in, 67
 - synthesis and characterization of, 66
 - excitons, 347
 - exciton state, 104
 - external cavity laser, 307
 - external energy, 167
 - external modulation, 310–311
 - extinction ratio, 71
 - extinction spectrum
 - Au nanorods, 236
 - Au NPs, 234
 - extracellular space (ECS), 373
 - extraordinary optical transmission (EOT), 81, 269
 - extrinsic fiber optic sensor
 - used in reflection, 359
 - used in transmission, 359
 - extrinsic fiber sensors, 450
 - eyepiece diaphragm, 427
- f**
- Fabergé Eggs, 419
 - fabricated “fabricated structure, 96
 - interferometric images, 98
 - fabrication methods, 143
 - fabrication procedure
 - Au SC-PIC using UV-NIL technique, 280
 - SP-RGB-CF using UV-NIL, 276
 - fabrication process, 383, 510
 - Fabry-Perot cavity, 210, 212
 - transfer matrix for, 15, 216
 - Fabry-Perot cavity-based signal, 210
 - Fabry-Perot interference, 78
 - Fabry-Perot interferometer, 356
 - sensor, 455
 - Fabry-Perot modes, for nanofibers, 69
 - Fabry-Perot resonator
 - with imbedded parity-time-symmetrical grating, 215
 - optical characteristics of, 15, 215

- Fabry-Perot structure
 - with PT-symmetric coupling, 212, 213
- Fabry-Perrot interferometer, 358
- Fabry-Pérot cavity, 306
- face-centered cubic (fcc), 507
- factor, 48
- Fano-type interference, 82, 87
- Faraday effect, 307
- faster and slower spectral components
 - exchanging of, 300
- fast Fourier transform, 318
- FDTD calculations, 37
- FDTD method, 35, 37, 83, 88
- FEC. *see* forward error coding
- femtosecond laser, 387, 393, 396, 399
- Fesub3/subOsub4/sub NPs, 242
- Fermat principle, 295
- Fermi level, 454
- FFT. *see* fast Fourier transform
- fiber attenuation, 311
- fiber Bragg grating (FBG), 356, 456, 464
- fiber micromirror sensors, 459
- fiber nonlinearity, 302–304
- fiber optic hydrogen sensors, 455
 - cross-sensitivity, 460
 - fast response, 460
 - fiber evanescent wave sensors, 463
 - fiber grating sensors, 464
 - fiber surface plasmon resonance sensor, 457
 - hydrogen monitoring, 460
 - hydrogen quantification, 460
 - metal hydrides, 20, 461
 - Pd alloys, 460
 - rare-earth materials, 461
 - reproducibility, 460
 - sensitive material, 460
 - tungsten oxide (WOsub3/sub), 462
- fiber optic liquid-level sensor
 - for aerospace applications, commercial airplanes, and cryogenic environment, 473
- fiber optic sensors (FOS), 355, 448
 - extrinsic fiber sensors, 450
 - intrinsic fiber sensors, 450
- fiber-optic spectroscopy, 522
- fiber-optic systems, 319
- 40-fiber ribbon cable formation, 485
- fiber structure and configurations, 360
- fidelity, 114
- field-induced motion, 302
- filled space configuration, 166, 183, 184
- filled space grating, 166
- filled space problem, 162
- filled space PT-symmetric grating, 166, 180
- film microstructure, 454
- fingerprints, 428
- finite-difference frequency-domain method, 79
- finite-difference time-domain (FDTD), 33, 82
- finite element method (FEM), 370
- first-order Bragg diffraction angle, 176
- first-order coupled wave equations, 161, 166
- first-order diffracted light, 167
- first-order diffraction, 170, 172
 - amplitude, 152
 - modes, 159
- first-order reflection
 - coefficients, 161
- first-order transmission amplitude, 172
- flat capillary cell, 512
- flexible CC laser cavity structure, 495
- fluorescence emission spectrum, 32
- fluorescence microscopy, 68, 433
 - image, 67
 - bent nanofiber, 68
 - channel drop filter, 75
 - rings, 72
 - TC nanofiber, 66, 67
- fluorescence spectrum, 30
- fluorodeoxyglucose (FDG), 373
- focused ion beam (FIB), 269
- forward error coding, 318
- Fourier images, 97
 - cut-line plots of, 98
- Fourier transform, 43, 435
 - limited condition, 131
 - limited optical spectrum, 301
- four wave mixing, 304
- FP resonator, 223, 227
 - transfer matrix of, 217
- Franz-Keldysh effect, 310
- free space, 147, 174
 - communications, 322
 - diffraction, 174
 - on active gratings, 14, 148
 - value, 31
- frequency mode spacing, 306
- frequency shift, 40
- Fresnel coefficients, 168, 386
- Fresnel lenses, 340
- fringe pattern, 455
- fuel injectors, 384, 393
- full width half-maximum (FWHM), 213, 310, 473
- fully constructive cavity interaction, 220
- fully destructive cavity interaction, 230
- fully-mixed state, 119

- function
 - decay rate, 134
 - polarization angle, 116
 - x polarization angle, 117
- functional devices
 - basics of, 305–314
- functional devices, optical sources, 305–310
- functional-tuning elements, 144
- futorology, 528
- FVMQ rubber sheet, 519
 - black color, 519
 - by inflation and shrink process, 521
- FWHM. *see* full width at half maximum
- FWM. *see* four wave mixing

- g**
- GaAs:N case, 131
 - centers and single-photon emission, 132
 - centers in δ -doped, 13, 132
 - growth conditions and macro-PL, 132
 - overview of, isoelectronic traps, 13, 131
- GaAs quantum dots, 38
 - AFM image of, 110
 - comparison, statistics of anisotropy-induced FSS, 110
 - in PC microcavity, 39
 - in vacuo scanning tunneling microscopy images, 109
- gain/loss distribution, 174
- gain/loss grating, 151
- gain/loss modulations, 146, 148, 150, 156, 157, 162, 172
 - depth, 147
- gain/loss periodic distribution, 148, 157
- gain/loss reflective volume grating, 148
- gain modulation, 150
- gain profile, 145
- gain saturation process, 308
- galvanometer scanner, 385
- GaP:N case
 - macro-PL from bulk GaPN, 127
 - μ PL of NN pairs in δ -doped GaPN, 127
 - single-photon emission from δ -doped, 13, 130
- gas-liquid interface, 476
- Gaussian beam, 386
- Gaussian profile, 156
- Gaussian pulse, 213
- Gauss's theorem, 34, 44
- gelation
 - by photoinduced polymerization, 510
- gelled colloidal crystal, 510
- gel sensitive, to temperature changes, 520
- geometry
 - of asymmetrical diffraction, 149
 - for calculating the dispersion relation, 76
 - of a plasmonic cavity, 48
- germanium, 295
- glass-gel-glass plates, 520
- glass high-melting point, 360
- glass to glass welding, 395
- glia (glial cells), 373
- gradient index (GRIN), 296, 472
 - layers, 336
- grain size, 403
- grating, 146, 149, 153
 - area, 148
 - equation, 176
 - length, 147
 - period, 149
 - profile combines index, 145
 - quality factor, 150
 - response, 156
 - slab, 148, 158
 - strength, 155
 - theoretical analysis, 194
 - thickness, 155
 - visibility, 188, 189
- grating-assisted codirectional coupler, 205, 206
- grating-assisted coupler, 207
- grating “Green’s function, 34, 42, 43, 46
 - retarded, 43
- GRIN lens, 477
- group index, 306
- group velocity, 299
 - dispersion, 299
- guiding mechanism, 293

- h**
- Hanbury-Brown and Twiss (HBT), 130
- head-mounted display (HMD), 144
- head-up display (HUD), 144
- heat-and-pull technique, 437
- heat conductivity, 371
- heat transfer
 - equations, numerical and analytical solutions of, 360
 - in solids, 360
 - in transparent materials at high temperatures, 361
- heat transport, 362
 - equation, 361, 363, 371
- Heidelberg instruments, 398

- Heisenberg indeterminacy, 17, 312
 - principle, 312
 - relationships, 312
 - Heisenberg's uncertainty principle, 39, 126
 - Hellenic Institute of Holography (HiH), 417
 - Helmoltz propagation equation, 303
 - He-Ne (helium-neon) laser, 29, 30
 - Henry parameter, 309
 - Hermitian operator, 42
 - Hermiticity condition, 146
 - heterodimer, 238
 - heterostructure, 459
 - heuristic and intuitive approach, 291
 - hexagonal close-packed structures, 507
 - high accurate laser micromachining, 384
 - higher diffractive orders, 178
 - first diffraction orders, 178
 - second diffraction orders, 179
 - high-incidence illumination rays, 429
 - highly interactive optical visual information system, 319
 - high-power lasers, 396
 - high-Q resonators, 32
 - high-resolution TEM image, 238
 - of composite, 236
 - high-temperature superconductors, 389
 - Hi-Ovis. *see* highly interactive optical visual information system
 - H-mode polarization, 177
 - hole arrays, 83
 - hollow-core fibers, 305
 - HoLoFoS model (λ) LED spotlight, 418
 - hologram, 144
 - grating, 157
 - of museum artifacts, recording, 418
 - of Princess of the Iris decorative plate, 417
 - holographic emulsion, demands on, 404
 - holographic method, 491
 - holographic optics, 145
 - holographic-polymer dispersed liquid crystal, 144
 - holographic recordings, with mobile equipment, 418
 - holography, 404, 433
 - homogeneous equation, 164, 165
 - homogeneous wave equation, 34
 - Horse Jaw hologram, 418
 - humidity, 464
 - dependence of the sensor response, 464
 - hybrid index, 156
 - hydrogenation, 451
 - of thin film, 453
 - hydrogen consumption, 444
 - hydrogen detection, 450
 - fiber systems, 456
 - hydrogen economy, 444
 - hydrogen embrittlement, 443
 - hydrogen explosions, 443
 - hydrogen micromirror fiber sensor, 461
 - hydrogen pressure composition isotherm, 460
 - hydrogen sensor, 443, 444, 445, 446, 463
 - types of, 445
 - hydrogen tetrachloroaurate(III) tetrahydrate (HAuCl₄/sub-4span cssStyle="font-family:monospace"Y/spanHsub/ subO), 237
 - hydrometeors, 294
 - hydrophilic surface, 518
 - hydrophobic surface ligands, 242
 - hydroxypropyl cellulose (HPC), 240
 - hyperspectral imagery, 425
 - hypotenuse face, 478
- i*
- ignition sources, 447
 - IL. *see* injection locking
 - illumination beam, 429
 - illumination light, 425
 - illumination rotation, 437
 - image forming mechanism, 429
 - image quality, 404
 - imaginary grating, 147
 - IMIMI structure
 - for an outer SPP, 94
 - implementation of parity-time symmetry, in optics, 145
 - impurity ions, screening effect, 509
 - impurity levels, 33
 - incidence angle, 167, 295
 - incident spectrum, 340
 - incident wave, 158
 - incoherent light tomography, 438
 - incompatibility, 273
 - index grating, 154
 - index modulation gratings, 151
 - inductive coupled plasma (ICP), 272
 - industrial laser micromachining platform, 388
 - Industry 4.0, requirement for, 355
 - inelastic interaction, 356
 - inelastic scattering, 356
 - infinitesimal polarization mode dispersion, 301
 - infrared femtosecond laser, 394
 - inhomogeneous wave equation, 44, 46
 - injected current, 309
 - injection locking, 307

inorganic solid matrices, 233
 insulator-metal-insulator-metal-insulator (IMIMI), 93
 integrative optical imaging (IOI) technique, 372
 interaction strength, 32
 interband
 – dynamics, 308
 – electronics time constant, 315
 interference lithography, 339
 interferometric microscopy, 82
 – built in-house, 96
 intermodal dispersion, 296
 internal molecular arrangement, 66
 internal quantum efficiency, 345
 internet service providers, 320
 intersymbol interference, 299
 intrabandgap level, 345
 intracellular space (ICS), 373
 intramodal dispersion, 299
 intrinsic/extrinsic fiber, 450
 intrinsic fiber optic sensors, 358
 – used in transmission, 358
 intrinsic fiber sensors, 450
 inverse propagation techniques, 318
 invisibility, phenomenon of, 147
 I/O bus channel nanofiber, 74
 ionic liquid (IL), 501
 IREPA laser, 387
 isoelectronic centers, 131
 isoelectronic doping, 131
 isoelectronic impurities, 126
 isoelectronic trap, 13, 126, 128
 isomorphism, 146
 isotropic-resolution images, 436
 ISP. *see* internet service providers
 Italian Renaissance, 295
 ITO-coated glass, 262

j

Johnson noise, 314
 Jones matrix, 252
 Jones vector, 250
 Joule heating, 57

k

key laser tools, 392
 K öhler, 426
 Köhler illumination, 428
 – principle, 430
 – system, 428
 – in transmission microscopy, 427
 kinetic energy, 39

Kirchhoff's law, 55
 Kogelnik model, 144
 Kogelnik's coupled wave theory, 146
 Kogelnik theory, 143
 Kossel pattern, 512, 514
 Kramers-Kronig relationship, 308
 Kronecker symbol, 149

l

lamp filament, 426
 Langmuir-Blodgett technique, 495
 lanthanum hydrides, 461
 large-area SP-RGB color filter, using UV-NIL, 273
 – device design, 274
 – device fabrication and transmission characteristics, 275
 laser ablation, 392
 laser action
 – on-demand photoswitching of, 498
 laser beam, 29
 laser cavity, 385
 – structures, 490
 laser diodes, 397
 laser emission, 385
 laser fabrication, 387
 laser filamentation, 395
 laser fluence, 393
 laser-induced damage threshold, 393
 laser-induced forward transfer, 384, 389, 391
 laser machining process, 384, 392
 laser mean power, 385
 laser methods, scale based, 396
 laser micromachining, 383
 laser microwelding, 395
 laser nanofabrication, 383, 384
 laser nanomachining
 – applications, 384
 laser physics, 305
 laser power, 395
 laser scan paths, 393
 laser sources, 293
 laser spectra, from CC gel film, 502
 laser spot, 386
 – interaction, 392
 laser threshold current, 306
 laser welding, 384
 lasing frequency, 307
 lattice constant, 40
 lattice temperature, 344
 laws of diffusion, 372
 layer-by-layer assembly, 495
 layer-by-layer dry etching, 95

- LED. *see* light emitting diode
 - left-handed circular (LHC), 250
 - LHC polarization, 266
 - Li-Fi. *see* light fidelity
 - LIFT. *see* laser-induced forward transfer
 - liftoff process, 271, 273
 - light-emitting diode (LED), 271, 319
 - lights, 403
 - light-emitting materials, 489, 496
 - light-emitting 1,3,5,7,8-pentamethyl-2,6,-diethylpyromethene-difluoroborate complex (PM), 498
 - light-exciton coupling, 74
 - light fidelity, 322
 - light incident
 - from air, 170
 - from substrate, 169
 - light line, 77
 - light-matter interaction, 425
 - light propagation, 448
 - light transmission, through hole/slit arrays, 83
 - light trapping, 337
 - light traveling, 476
 - linear entropy, 120
 - linear polarization, 263
 - linear polarized (LPlm)
 - step-index multimode fiber, 449
 - linear system of N equations, 365
 - linear variable differential transducer (LVDT), 480
 - lineic attenuation coefficient, 298
 - linewidth, 309
 - liquid crystal (LC), 143
 - displays, 273
 - liquid crystals on silicon (LCOS), 144
 - liquid environment, 477
 - liquid-level detection system, 485
 - liquid-level sensor performance, 485
 - liquid-level sensor probe, 480
 - liquid nitrogen, 485
 - from gas, 484
 - liquid nitrogen test, 483
 - liquid to vapor (L-V) response time, 480
 - lithium niobate, 384
 - traveling waveguide, 310
 - lithographic techniques, 39, 270, 491
 - lithography-based metal patterning, 273
 - LO. *see* local oscillator
 - load resistor, 314
 - local deposition, 392
 - localized surface plasmon resonance (LSPR), 235
 - local oscillator, 316
 - long-distance fully secured communication
 - quantum key distribution, 103
 - long-haul
 - communication systems, 311
 - and high bit-rate systems, 314
 - long homogeneous cylinder, radial variation, in
 - temperature for, 362
 - longitudinal LSPR of the Au nanorods, 235
 - long-period grating (LPG), 456, 472
 - lop-sided diffraction, 146
 - Lorentz-Drude model, 94
 - Lorentzian function, 35, 45
 - loss/gain modulations, 148
 - lowest eigenvalue of energy, 293
 - LPG-based liquid sensor, 475, 477
 - LPG-based sensor, 485
 - LPG-based system, 485
 - LPG diffraction band, 476
 - LPG operating principles, 476
 - LPG sensor liquid-level system, 475
 - LSPR resonance, 235
 - LSPR wavelength, 235
 - of metal NPs, 235
 - luminescence, 233
 - band, 39
 - emission, 32, 40
 - spectrum, 30
- m***
- Mach-Zendher interferometer, 310, 311, 455, 456
 - Mach-Zendher optical modulator, 311
 - macro-PL from bulk GaP:N, 127
 - macro-PL spectrum, 127, 131, 132
 - of δ -doped GaAs:N, 135
 - magnetic dipole (MD), 42
 - transition, 41
 - magnetic field intensity, 177
 - magnetic materials, 34, 42
 - magnetofluorescent nanoprobles, 242
 - magnitudes, 149
 - Makimoto's model, 136
 - Manakov equation, 303
 - mask deposition, 384
 - mass diffusion transport, in heterogeneous
 - media, 374
 - mass production, 383
 - mass spectrometer sensors, 444
 - mass spectrometry techniques, 445
 - mass transport, 375

- material, 384
 - deposition, 18, 384, 392
 - response, 386
 - welding, 395
- MathCad program, 361
- mathematical models, 360
- matrix multiplication, 217
- Maupertuis' principle of mechanics, 295
- Maxwell equation, 34, 43, 46, 160, 177, 296, 335, 448
- mean-squared phase fluctuations, 304
- mechanical energy, 383
- Med-tech, 384
- metal-dielectric films, 82
- metal-dielectric interface, 81
- metal film, 273
- metal hydride system, 451
- metal insulator metal (MIM), 282, 459
- metallic filters, 82
- metal nanodomains, 235
- metal NPs, 237
- metal organic chemical vapor deposition (MOCVD), 125
- metal-oxide (Mox), 445
- metal-oxide multilayers, 30, 32
- metal pattern, 273
- metal reflection of radiofrequency, 296
- metals, 233
- metamaterial (MM), 249, 269
- metasurface insulator layer, 284
- metasurface thermal emitters, 282
 - fabrication process of, 284
- metasurface thermal emitters for infrared
 - CO₂/sub detection, by UV-NIL, 282
- device fabrication and optical properties, 16, 283
- metasurface design, 282
- method of undetermined coefficients, 164
- Mg alloys, dehydrogenation/hydrogenation of, 461
- micelle-coencapsulated Si QDs, 242
- micelle-encapsulated nanocomposites, 234
- micelle encapsulation, 241
- microcavities, 39, 47
- microcutting, 384, 393
- microcylinder, 389
- microdisk, 489
- microdrilling, 384, 393
 - nondivergent beams, 388
- microfluidic, 399
- microholography, 432
- micromachining, 387
- micrometer scale, 65, 70
- microparticle diameter, 493
- microphotonics, 343, 529
- micro-PL spectrum of GaAs QDs without PC structure, 40
- micropolarizer arrays, 32
- microscope PL image, of Au-doped nanofibers, 240
- microscopic scale, 431
- microscopy images, 431
- microspectroscopy, 516
 - system, 281
- microsphere, 389
- Miller indices, 512
- millimeter-scale propagation, 69
- millisecond pulsed lasers, 395
- MIMO. *see* multi-input multioutput
- miniature fiber optic spectrometer, 521
- miniaturization, of photonic circuits, 66
- miniaturized AMZI from waveguides, 70
- miniaturized photonic circuit components,
 - constructed from TC nanofibers, 69
- asymmetric Mach-Zehnder interferometers, 69
- microring resonators, 71
- – channel drop filters, 74
- miniaturized photonic circuits, 65
- mismatch factor, 149, 152
- missing cone, 437
- MMI. *see* multimode interferences
- mode coupling in PT-symmetric grating, 165
- mode partition noise, 306
- modern industrial lasers, 383
- modified Bessel functions, 150
- modulation of gain and loss, 157
- module packaging, 314
- molar ratio, 132
- molds, 271
- molecular beam epitaxy (MBE), 39, 131
- momentum conservation law, 103
- monochromatic light
 - in phase-contrast microscopy, 431
- monochrome holography, 404
- monodispersed colloidal microparticles, 493
- Moore's law, 319
- MQW. *see* multiquantum well
- multi-input multioutput, 302
- multijunction cells, 341
- multilateral shearing interferometry, 433
- multilayer deposition, 95
- multimode cavity, 47
- multimode fibers, 16, 295, 296
 - indoor application, 297
- multimode fiber vs. single mode fiber, 296, 297

- multimode interferences, 315
- multiphoton absorption, 387, 394
- multiphoton-induced polymerization, 495
- multiphoton polymerization, 491
- multiple exciton generation, 345, 347
- multiple interference, 29
- multiplexer, 315
- multiplexing techniques, 293
- multiplicative factor, 309
- multiquantum well, 306
- Muse 3D platform
 - IREPA laser, development by, 388
- MUX. *see* multiplexer

- n**
- nanoantenna metasurfaces, 143
- nanocomposite, 234, 235, 239, 243
- nanocone arrays, 337
- nanocrystals, 233
- nanodrilling, by nondivergent beam, 393
- nanofabrication technique, 270
- nanofibers, 65, 66
 - doped with Si QDs, 240
 - of organic dye, 66
- nanohole, 273
- nanoimprint, 270
 - technique, 271
- nanoimprint acrylic (NIAC), 271
- nanoimprint cationic (NICT), 271
- nanoimprint lithography (NIL), 269
- nanomachining process, 392
- nanometric scale, 333
- nanoparticle (NP), 233
- nanoparticle fabrication, 392
- nanophotonics, 291, 333, 527
 - applications, 529
 - devices, 271
 - fundamental
 - and applications-oriented research, 528
 - developments, 527
 - futurology, 528
 - represent, 529
 - structures/materials, 269
 - summing up, 529
 - technologies, 291
- nanopillar arrays, 337
- nanoplasmonic guided optic hydrogen sensor, 443
 - acoustic sensors, 445
 - hydrogen sensors, 447
 - “mass spectrometer sensors, 444
 - solar, and nuclear power plants, 444
 - spectroscopic sensors, 444
- nanoporous Au films, 233
- nanoprobes, 233, 242
- nanoscale, 239
- nanoscopy, 383
- nanoslit arrays, 85
- nanostructures, 333
- 2-naphthalenethiol, 239
 - conjugated Ag-Au alloy NPs, 239
- narrowband
 - reflection, 223
 - thermal emission, 52
- Nath factor, 150, 152, 153
- natural extension, 437
- near-infrared, 385
 - region, 297
- near to eye display (NED), 144
- negative dielectric constants, 42
- negative refractive index, 249
- neodymium yttrium aluminum garnet (NdYAG) laser beam, 496
- neurons, 373
- neutral density (ND), 281
 - filters, 428
- new fiber materials, and structures, 304
- Newton rings, 395
- NF. *see* noise factor
- Nielsen law, 320
- NIL fabrication process, 286
- NIR. *see* near-infrared
- NIR nanosecond laser, 391
- nitrogen, 125
 - atoms, 129
- nitrogen triplet (NNN) state, 128
- NLSE. *see* nonlinear Schrödinger equation
- N-methyl-2-pyrrolidone (NMP), 273
- NNsub4/sub
 - atomic arrangements, 130
- noise accumulation, 312, 314
- noise factor, 313
- noise power, 293
- noise tolerance, 306
- nonclassical single-photon emission, 125
- nonconstant coefficient differential equations, 159, 175
- nonconventional diffraction efficiency modulations, 145
- nondivergent subwavelength beams, 388
- nonexcited mode, 77
- non-Hermitian complex refractive index, 145
- non-Hermitian Hamiltonians, 146
- nonhomogeneous equation, 165
- nonhomogeneous second-order differential equation, 164

- nonlinear infinitesimal effects, 303
 - nonlinear materials gain/loss modulations, 145
 - nonlinear noise power, 304
 - nonlinear refractive index, 303
 - nonlinear Schrödinger equation, 303
 - nonnormal light incidence, 154
 - nonparaxial light propagation, 147
 - nonradiative energy relaxation, 133
 - nonreciprocal behavior, 145
 - nonstandard efficiency modulations, 145
 - nonsymmetrical configurations
 - of PT-symmetric grating on a substrate, 187
 - nonvacuum conditions, 271
 - notch filter, 29, 30
 - numerical aperture (NA), 296, 428
 - of condenser, 428
 - numerical computations
 - physical parameters of the problem in, 371
 - numerical results, for conductive transport, 366
 - numerical simulations, 360
 - numerical solution, 79
- o**
- OAM. *see* orbital angular momentum
 - OFDM. *see* orthogonal frequency division multiplexing
 - OFS for Hsub2/sub detection, 455
 - OLT. *see* optical line termination
 - only single-mode lasing, 200
 - ONU. *see* optical network unit
 - optical amplification, 311–314
 - needs of, 311
 - optical amplifiers, 293, 294
 - noise figure, 313
 - technologies, 311
 - optical angular frequency, 299
 - optical axis, 388
 - optical bands, 298
 - optical carrier frequency, 301
 - optical cavity resonator, 309
 - optical channel capacity, 292, 293
 - theoretical value, 294
 - optical circuits, 312, 315
 - input, 293
 - optical cloaking, 398
 - optical coherent
 - detection, 302
 - receiver, 317
 - optical communication, 291, 355
 - channel, 291
 - systems of today, 319–322
 - optical connection
 - to end users, 320
 - optical devices controlling polarization, 264
 - optical domains, 17, 302, 314
 - optical effects, used in optical fiber sensors, 355
 - optical fiber, 16, 17, 291, 294, 320, 355, 356, 359, 360, 399, 449
 - advantages of, 447
 - attenuation
 - limiting factor, 297
 - based liquid-level sensor detection system, 471
 - based sensors
 - for liquid-level detection, 472
 - communication, 291
 - and sensor technology, 355
 - core, 449
 - EMI-free nature, 485
 - hydrogen sensors, 447
 - long-period grating, 472, 473
 - numerical aperture of, 449
 - propagation, 293
 - sensing technology, 360
 - sensor, 360, 373, 379, 445, 450, 463
 - system, 471
 - tip, 389
 - optical filter, 12, 82, 317
 - optical frequency
 - chirping, 308
 - decay, 303
 - range, 293
 - tuning, 309
 - optical gratings, 147
 - optical impedance, 386
 - optical isolator, 146, 307, 314
 - optical-level sensor designs, 476
 - optical line termination, 320
 - optical link, 294
 - optically active luminescent centers, 126
 - optical materials, 384
 - optical micrograph
 - AMZI, 70
 - channel drop filter, 75
 - optical microscopic system, 503
 - optical network unit, 320
 - optical performance of Si QDs, 233
 - optical phase information, 302
 - optical photons, 314
 - optical power spectral density, 293
 - optical properties, 29, 134, 285
 - alteration of, 29
 - matter by design of its electromagnetic environment, 31

- matter, influenced by, 32
 - optical properties of matter
 - LDOS changes, 32
 - optical pumps, 311, 312
 - optical ray, 295
 - optical resonant cavity, 306
 - optical sensors, 240, 355, 360
 - optical signal, 293
 - optical signal-to-noise ratio, 304
 - optical strain sensor, tensile testing, 521
 - optical system capacity, 323
 - optical time domain multiplexing, 315
 - optical time domain reflectometer (ODTR), 472, 474, 478
 - demonstration of probe array, 479
 - interrogation of multiple sensors, 478
 - optical-to-electrical conversion, 314
 - optical transition, 103
 - optical transmission properties, 273
 - optical transmittance spectra, 88
 - optical transport, 294
 - optical tweezer, 389
 - optical wireless, 17, 322
 - OptoClonesTM, 417, 418, 419, 420, 421
 - optoelectronic devices, 282, 294
 - optoelectronic nanomaterial, 233
 - optoelectronics, 233, 243, 291, 507
 - orbital angular momentum, 322
 - organic dye, 239
 - crystals, 65
 - organic surface ligands, 236
 - orientation angle, 38
 - original photonic crystal, 33
 - orthogonal correlation degrees, 118
 - orthogonal frequency division multiplexing, 318
 - oscillating dipole, 34
 - moment, 36, 38
 - oscillating electric dipole moment, 35, 38
 - oscillating electric polarization, 46
 - oscillating magnetic dipole, 44
 - moment, 42
 - oscillation frequency, 34, 36
 - oscillator strength, 65
 - OSNR. *see* optical signal-to-noise ratio
 - OTDM. *see* optical time domain multiplexing
 - out-of-band noise, 317
 - Owl Jug and the Ring color hologram, 419
 - oxygen deficiencies, 30
- P**
- packaging, 297
 - palladium forms metal hydride (M-H), 451
 - parametric down conversion (PDC), 104
 - parity-time (PT), 193
 - symmetric cavities, 193
 - symmetry
 - in diffractive optics, 143
 - in gratings, 145
 - partial gap, 33
 - partially constructive cavity interaction, 223
 - partially destructive cavity, 220
 - interaction, 228
 - passive optical network, 322
 - pattern transfer process, by UV imprint lithography, 271
 - PC cavity, 38, 40
 - PC microcavities, 29
 - PC-slab microcavities, 38, 39
 - Pd alloys
 - advantages of, 460
 - Pd_{0.6}/subA_{0.4} films, 461
 - Pd-diffused hydrogen (H₂/sub) carrier, 127
 - Pd hydrogenation, 453
 - Pd hydrogen sensing systems
 - bulk palladium film, 451
 - metal properties upon hydrogenation, 454
 - thin film, 20, 453
 - Pd pressure composition isotherm
 - for H in Pd, 452
 - Pd/WO₃/sub dispersed silicone resin, 463
 - peak frequency, 38
 - perfectly asymmetrical grating, 150, 151
 - perfectly matched layer (PML), 37
 - permeability, 34, 158, 174
 - of free space, 44
 - α phase, 451
 - β phase, 452
 - phase amplitude coupling factor, 308
 - phase amplitude microscopy, 431
 - differential interference-contrast microscopy (DIC), 431
 - digital holography, 432
 - phase-contrast microscopy, 431
 - wavefront analyzer, 433
 - phase and gain/loss modulation, 145
 - phase-contrast microscopy, 429, 430
 - for phase transforming, 430
 - phase/gain/loss modulations, 145
 - phase grating, 194
 - phase memory, 310
 - phase microscopy, 426, 434
 - studies, 434
 - phase modulation, 166
 - phase opposition, 430
 - phase plate, 431

- phase transition, 453
- phase velocity, 299
- phonon occupancy factor, 312
- phosphine (PH_{sub3}/sub), 127
- phospholipid micelles, 241
- phosphorus (P), 126
- phosphorus codoped colloidal Si QDs, 236
- photochromic diarylethene derivative (BMTM), 499
- photochromic light-emitting materials
 - chemical structures, 499
- photochromic reaction, 498
- photoconversion, 529
- photocuring, 273
- photocurrent, 316
- photodetectors, 355
- photodiodes, 355
 - detectors, 113
- photoelasticity, 356
 - effect, visualization of, 356
- photoexcited carriers, 333
- photographic emulsion making process,
 - general description of, 407
- photoinduced polymerization, 510
- photolithography, 383
- photoluminescence (PL), 39, 66, 127, 233, 269
 - spectra, 106
- photon, 296
 - antibunching, 130
 - correlation
 - – measurements, 113, 133
 - – setup, 112
 - density, 31
 - emission, 40
 - – suppressed, 41
 - energy, 299
- photonic applications, 233
- photonic band
 - calculations, 33
- photonic band gap, 51, 52
 - in 3D photonic crystals, 52
- photonic band gap (PBG), 29, 490
- photonic band structure, 32, 33
- photonic circuits, 65
- photonic counterpart, 65
- photonic crystal, 32, 507
 - with blackbody, 57
- photonic crystal (PC), 29, 51, 52, 269, 398, 492, 493, 507
 - band-gap structures, 399
 - for infrared emissivity, 51
 - microcavity, 32
 - slabs, 33
 - unconventional thermal emission, 51
 - waveguides, 65
- photonic devices, 291
- photonic jet generation, 390
- photonic MMs, 252
- photonic nanojet, 384, 387, 389, 392
- photonic rubber sheet, 519, 521, 522, 523
- photonics, 287, 333, 384
- photonics band gap, 305
- photon management, 334
 - techniques, 348
- photon-photon nonlocal correlations, 103
- photon source, 104
- photopolymerization, 397
- photoreceiver electronic bandwidth, 317
- photoresist templates, 495
- photosensitive materials, 404
- photovoltaics, 343
- physical vapor deposition technique, 392
- picosecond lasers, 393
- planar backside mirror, 338
- planar purely reflective grating of the index and gain/loss, 173
- Planar slanted grating of index, 157
- Planck constant, 293
- Planck's law, 31
- PL and PLE spectra, of Si QDs, 234, 236
- plane-wave expansion, 33
 - method, 32, 33
- plasma-enhanced chemical vapor deposition (PECVD), 275
- plasma plume, 392
- plasmon-enhanced sensors, 269
- plasmonic cavities, 31, 42, 46
- plasmonic effects of metal nanostructures, 233
- plasmonic enhancement of PL from Si QDs, 240
- plasmonic microcavities, 29, 41
- plasmonic/phononic materials, 61
- plasmonic resonance, 269, 281, 282, 392
- plasmonic resonator, 42
- plasmonics, 333
- plasmon resonance, in subwavelength-sized structure, 283
- plastic optical fibers, 305
- PL decay rate, 235
- PL excitation spectra, 235
- μ-PL images of NN_{sub4}/sub pairs, 129
- PL intensity, of nanocomposites, 235
- μ-PL measurements, 128
- Plot of fitnesses, 73
- Plot of Q-factors, 73

- μ-PL spectra at several positions of δ-doped GaP:N, 129
- PL stability in prostate cancer tumor microenvironment, tests of, 243
- P2MP. *see* point-to-multipoint
- p-n homojunction, 305
- p-n junction, 340, 344
- Pockels electro-optic coefficient, 310
- Pockels electro-optic effect, 310
- POF. *see* plastic optical fibers
- Poincaré sphere, 116, 118
- point-to-multipoint, 321
- point-to-point, 321
- polarimetric imaging, 425
- polariton theory, 69
- polariton waveguides, 66
- polarization, 76
- polarization beam splitter (PBS), 112
- polarization-controlling optical devices, 249
 - using Jones matrices, 250
- polarization-dependent filters, 82
- polarization direction, 95
- polarization diversity management, 319
- polarization gratings, 143
- polarization mode dispersion, 299
- polarization modulation, 456
- polarization patterns, 136
- polarization selectivity, 143, 144
- polarization vector, 45
- polarized microscopy, 430
- polarizer, 112, 398
- poly(acrylamide) hydrogel matrix, 499
- poly(dimethyl siloxane) (PDMS), 494
- poly(ethylene glycol) diacrylate (PEG-DA), 496
- polyethylene jacket, 295
- poly(ethylene terephthalate) (PET), 496
- polymer assemblies, 234
- polymer encapsulation, 239
- polymer hydrogels, 498
- polymer nanofibers, 239
- polymers, 233
- polymethyl methacrylate, 507
- poly-methyl-methacrylate (PMMA), 270
- poly(N-methylolacrylamide-co-N,N'-methylenebisacrylamide), thermo-insensitive polymer hydrogel of, 500
- polynomial gradients, 336
- polystyrene (PS), 493, 507
 - colloidal crystal, 519
 - SEM images of discrete single microparticles, 494
- PON. *see* passive optical network
- population inversion factor, 305
- pore space, 376, 378
- porosity, 374, 377
 - value, 378
- positive-charged polymer (poly(allylamine hydrochloride) (PAH)), 234
- positive dispersion effect, 303
- positive group velocity dispersion mitigation
 - by self self-phase modulation, 304
- positively charged polymer-coated Au nanorods, 235
- postdetection signal processing, 302
- power density, 386
- power detection receiver, 292
- power spectral density, 293
- Poynting's vector, 34, 44, 47, 257
- P2P. *see* point-to-point
- prebacking time, 272
- pressure composition isotherms, 451
- principle of averaging method, 374
- probe response time
 - measurement of, 481
- projection amplitude, 114
- prominent modes of PT-symmetric grating
 - for incidence at different angles and from different sides, 171, 184
- propagating ray
 - through optical fiber via total internal reflection, 450
- propagation constant, 79, 148
- propagation equation, 388
- propagation impairments, 294
- PS microparticles
 - nonclose-packed uniform CC polymer hydrogel film, 500
- PT-symmetric
 - coupler, 214
 - GACC output, 209
 - optics, 145
 - passive structure, 147
 - reflection gratings, 176
 - reflective gratings, 216
 - structure, 146, 166
 - transmission grating, 170
 - volume grating, 172, 174
 - volume holograms, in transmission mode, 156
- PT-symmetrical Bragg grating (PT-SBG), 194, 216
 - bandwidth, 222
 - design, 222
 - grating, 224
 - strength, 223, 225

PT-symmetric coupling
 – with lowest possible lasing threshold, 204
 PT-symmetric grating, 161, 167, 172, 174, 176,
 197, 204
 – metamaterials, 147
 – for zeroth-order transmission, 167
 PT-symmetry breaking point, 196
 Pucell factor, 42
 pulsed laser, 389
 – deposition, 392
 pulse duration, 387
 – and repetition rate, 385
 pulse overlap, 393
 pumping electrons, 305
 Purcell effect, 38, 40, 41, 137, 235
 Purcell factor, 38, 45
 – for MD radiation, 46
 – for multimode plasmonic cavities, 47
 – for resonant emission, 47
 pure reflection dielectric gratings, 176
 pure reflection gratings, 176
 PV cells, 340

q

QCL. *see* quantum cascade laser
 Q factor, 37, 42
 – PC-slab cavity modes, 37
 – plasmonic cavities, 37
 – resonance, 41
 QKD. *see* quantum key distribution
 QoS. *see* quality of service
 QPSK. *see* quadrature phase shift keying
 quadratic detection, 316
 quadrature amplitude modulations,
 317
 quadrature phase shift keying, 311
 quality factor, 29, 35
 quality of service, 320
 quantum aspects, 291
 quantum cascade laser, 306
 quantum cryptography, 125, 322
 quantum dash, 306
 quantum dot (QD), 37, 306, 333, 349
 – application of, 108
 – artificial atoms
 – band-gap energy size of use of wave
 functions of, 105
 – droplet epitaxy of GaAs, 13, 109
 – entangled photon pair emission, 115
 – photon sources, 120
 – polarization characteristics of, 110
 – resonant coupling of, 125
 – statistics of, 111

quantum efficiency, 126
 – of Si QDs, 233, 235
 quantum entangled pairs, 104
 quantum-entangled photon-pair
 generation, 105
 quantum entanglement
 – characterization of, 112
 – criterion for, 114
 – degree of, 114
 – Peres criterion of, 120
 quantum information technologies, 125
 quantum key distribution, 103, 118, 322
 quantum mechanical treatment, 38
 quantum metrology, 103
 quantum nanostructure fabrication, 109
 quantum noise, 312
 – impairment, 293
 quantum optic, 399
 quantum phase diffusion, 17, 309
 quantum-state tomography, 13, 118
 quantum supercorrelation, 322
 quantum teleportation, 125
 quantum theory, 115
 quantum well, 57, 306, 345
 – absorption wavelength range, 58
 quarter wavelength, 430
 quarter-wave plate, 112
 quartz, 255
 – substrate surface, 84
 quasi-Fermi level, 305, 343
 quasi-two-dimensional structures, 33
 QW. *see* quantum well

r

RA. *see* Raman amplifier
 radar, light pulse sending, 474
 radial temperature distribution
 – in cylinder at different time moments, 368
 radiation energy, 35, 44
 radiation field, 51
 radiation power, 38
 radiation rate, 38
 radiation source, 36
 radiative heat, 371
 radio over fiber, 322
 radiotracers technique, 372, 373
 Raman amplifiers, 312
 Raman anti-Stokes transition, 312
 Raman effect, 312
 Raman-Nath diffraction, 151
 – equations, 146
 – regime, 147, 150, 152, 155
 Raman-Nath form, 149

- Raman scattering, 29, 356
 - in optical fiber, effect of, 356
 - Raman signals, 29, 239
 - Raman-Stokes transitions, 312
 - rare-earth elements, 345
 - ray injection, 295
 - Rayleigh diffusion, 16, 297
 - Rayleigh scattering, 355
 - in optical fiber, effect of, 356
 - ray theory, 296
 - reactive ion etching (RIE), 270
 - real-space calculations, 33
 - real-time iontophoretic (RTI) method, 372
 - receiver, 292
 - optical subassembly, 314
 - reciprocal lattice vector, 43
 - reconfigurable elements, 144
 - red, green, and blue (RGB), 81
 - reducing agents, 237
 - reflected wave (R), 158, 176
 - reflection efficiencies, 281
 - reflection hologram, 405
 - reflection, of zeroth order, 168
 - reflection probe, 522
 - reflection spectra, 222
 - of fabricated Au SC-PICs at normal incidence, 281
 - left-side, 226
 - reflective index, 474
 - reflective PT-symmetric gratings, with Fresnel reflections, 185
 - asymmetric slab configuration, 186
 - grating attached
 - – to left of substrate, 186
 - – to right of substrate, 188
 - symmetric geometry, 14, 185
 - reflective setup, 171
 - reflectometrical properties, 373
 - refraction distribution, 438
 - refractive index, 32, 38, 45, 50, 65, 68, 80, 145, 146, 147, 149, 157, 173, 174, 193, 275, 283, 356, 399
 - regular PC structures, emitted field, 34
 - relative dielectric permittivity, 157
 - relative intensity noise (RIN), 215
 - remote-object ultraprecision metrology/quantum metrology, 103
 - repetition rate, 387
 - representative elementary volume (REV), 374
 - residual resist layer (RRL), 272
 - residue theorem, 49
 - resins, 384
 - resonance curve, 41
 - resonance dip frequency, 48
 - resonance frequency, 40, 48
 - microcavities, 39
 - resonance mode, of cavity, 48
 - resonance wavelength, 285
 - resonant cavities
 - based on two PT-symmetric diffractive gratings, 194
 - resonant field distribution, 48
 - RGB color filters, 89
 - polarization dependence of the transmission spectra, 91
 - transmission spectra of, 90
 - RHC polarization, 252, 265
 - rhodamine 640 (Rh), 495
 - rhodamine 6G (R6G) dye, 280
 - right-handed circular (RHC), 250
 - right-side diffraction, 177
 - rigorous coupled-wave analysis (RCWA), 256
 - ripples, 396
 - ripples' orientation on stainless steel
 - color effect, 397
 - rippling effect, 169
 - RoF. *see* Radio over fiber
- S**
- SC. *see* supercontinuum
 - scalar diffraction, 149
 - scalar wave equation, 148
 - scanning electron microscopy (SEM), 87, 240, 254, 271, 493, 519
 - image of electrospun HPC nanofibers doped with Si QDs and Au NPs, 240
 - image of PC slab with L3 defect cavity, 39
 - images of various quartz molds for UV imprint lithography, 272
 - scattering process of excitons, 131
 - Schawlow-Townes relationship, 310
 - schematic illustrations of an SC-PIC, 279
 - Schmidt's method, 43
 - Schrödinger equation, 146
 - scintigraphy, 373
 - second harmonic generation (SHG), 496
 - second-order
 - correlation function, of emitted photons, 137
 - coupled mode equations, 157
 - derivatives, 173
 - equations, 165, 172
 - Maxwell equations, 172, 174
 - self-assembly techniques, 507
 - self-focusing effect, 387
 - self-phase modulation, 303

- semiconductor, 33
 - DFB lasers, 193
 - impurities/defects in, 125
 - laser, 305
 - – single-mode operation, 306–308
 - light emission, 305
 - optical amplifier, 311
 - processing, 491
 - quantum dots, 107, 233, 239
 - surface, 335
- sensing, 384
- sensitometric tests, 413
- sensor, 356, 379
 - fabricated “response time, 481
- Shack-Hartmann analyzer, 433
- Shannon capacity theorem, 292
- SHA transmission spectra, 97
- shear-aligned colloidal crystal, 511
 - angle-dependent transmission spectra, 513
- shear flow, 510
- Shockey-Queisser limit, 349
- shorter face, 478
- Si-Au hybrid nanostructure, 241
- signal and noise energies
 - addition of, 292
- signal bandwidth, 292
- signal engineering, 291
- signal processing, 291
 - techniques, 318
- signal-to-noise (SN) ratio, 30
- silica fiber, 297
 - flexibility and robustness, 448
- silica optical fiber, 299, 391
 - attenuation, 298
 - dispersion, 298
 - optical transmission bands, 298
- silica particles, 507
- silicon
 - cells, 338
 - etching, 390
 - liquid, 515
- silicon-on-insulator (SOI), 279
- SilverCross emulsion
 - sensitometric response of, 414
- SilverCross Ultrafine-grain emulsion,
 - specification for, 408
- silver films, 82
- silver halide, 404
 - based materials, 404
 - emulsion, 404
 - – light scattering, 405
 - – preparation, principle, 407
- simulations, 360
- sinc function, 156
- single-beam color reflection holograms
 - on SilverCross plates, 416
- single-exponential function, 137
- single-junction solar cells, 333
- single-mode fiber (SMF), 295, 296, 448, 458
- single-mode optical fiber communication, 316
- single-photon counting technique, 130
- single-photon emissions, 125
 - tomography, 373
- single-photon generation, 133
- single-photon polarization state, 112
- sinusoidal oscillations, 117
- sinusoidal variation, 49
- SiOsub2/sub film, 87
- Si QD-based nanocomposites, 234
- Si QD core–Au shell nanocomposites, 235
- Si QD-Fesub3/subOsub4/sub NP
 - composites, 242
- Si QD micelle core-Au shell
 - nanocomposites, 241
- Si QDs nanocomposites, 235
- Si quantum dot-based nanocomposites, 233
- Si/SiOsub2/sub photonic crystal, 60
- Si-SiOsub2/sub quantum dot
 - superlattices, 342
- size-tunable plasmonic resonance of Au
 - NPs, 237
- slab attached
 - to left of the substrate, 187
 - to right of the substrate, 188
- slab boundaries, 147, 167
- slab in air, 185, 186
- slab surfaces, 167
- slanted grating, 157
- SLM. *see* spatial light modulator
- smartphone, 384
- SMDM-layer skew stacked structure, 266
- SMDM waveplate, 261
- Snell-Descartes law, 295
- sodium dodecyl sulfate (SDS), 493
- solar cells, 349
 - conceptual approaches, 344
 - hot carrier, 348
 - intermediate band, 345
 - multiple energy level, 344
 - single-junction, 343
- solar concentration, 341
- solar spectrum, 334, 343
- solid-state devices, 127
- soliton propagation, 303
- solution-dispersible Si QDs, 233
- space application, 341

- SP1 approximation model, 370
- spatial concentration, 18, 385
- spatial light modulator, 388, 393
- specific heat capacity, 361
- spectral, angular, and polarization selectivity, 143
- spectral bandwidth, 143
- spectral broadening, 306
- spectral channel repartition, 316
- spectral efficiency, 293, 323
- spectral hole burning, 308
- spectral optimization, 339
- spectroscopic sensors, 444
- spectrum of nondoped GaAs epitaxial layer, 133
- spherical cavity, 376
- spikes, 396
- spin angular momentum, 106
- spin orbit-coupled angular momentum, 106
- spin-spin correlations, 115
- splicing, 361
 - process, 371
- split-step algorithms, 303
- SPM. *see* self-phase modulation
- SP1 model, numerical results for, 370
- spontaneous emission
 - factor, 305, 310
 - lifetime, 107
 - noise description, 313
 - of photon, 32
- SPR-based fiber optic sensor, 457
- SP resonance (SPR), 269
- SPR fiber sensors, 458
- SP-RGB color filter fabrication procedure, 275
- SPR peak shifts, 457
- square transmission distance, 295
- stability, 69
- stabilizing agents, 238
- stacked complementary (SC), 254
- stacked metal hole array (SHA), 82
- stainless steel
 - wettability control, 397
- STEM-EDS mapping of
 - Si QD-Au-Ag bimetallic composite NP, 238
 - Si QD-Au composite NPs, 238
- step index optical fiber, 295
- stimulated emission
 - depletion-inspired optical lithography, 398
 - rate, 308
- stochastic effects, 319
- Stranski-Krastanov mode, 108
- submarine and terrestrial communication infrastructures
 - conquest of, 319
- submicrometer scales, 527
- subwavelength deposition
 - by LIFT technique, 389
- subwavelength drilling, 389
- Subwavelength etchings, 389
- subwavelength focusing of light
 - with photonic nanojet, 389
- subwavelength optical devices, 249–254
 - circular dichroic devices, 265
 - EM fields in the II-type SC polarizer, 258
 - functional subwavelength devices constructions, 264
 - II-type SC polarizer, 255, 256
 - mapping of photonic MMs, 251
 - metasurfaces, 263
 - nanoimprint lithography(NIL), 252
 - optical devices, using Jones matrices, 250
 - physical quantities of EM waves, 250
 - polarization-controlling optical devices, 249
 - stratified metal-dielectric MMs (SMDMs), 259
 - polarization conversion through, 262
 - transmission-type subwavelength waveplates made of MMs, 259
 - ultrathin polarizers, 254
 - ultrathin waveplates, 15, 258, 262
 - in SMDM, 260
 - ultraviolet(UV), 252
 - UV-nanoimprinted resist patterns, 254
 - UV NIL procedure, 253
- subwavelength polarizer
 - to Jones matrix, 251
- subwavelength quarter waveplate
 - to Jones matrix, 250
- subwavelength thickness, 249
- supercontinuum, 321
 - analysis, 303
- superlattice, 306
- surface antireflection coating, 343
- surface density, 128
- surface plasmon (SP), 83, 269, 456
 - resonance, 82, 456
 - sensors, 447
- surface plasmon polariton (SPP), 81
- surface texturing, 384, 396
- suspension, 510
- switching, 159
- symmetric function, 49

- symmetric quantum dots
 - natural growth, 108
- symmetric slab configuration, 167
- symmetric vs. filled space configuration, 167
- t**
- tandem cell, 340
 - all-silicon, 342
 - efficiencies, 341
 - as functions of subcells, 341
 - micromorph, 342
- tangential component, 160
- tangential electric field, 177
- tangential magnetic fields, 177
- tangle value, 120
- tapered fibers, 458
- Taylor expansion, 299
- TC nanofiber, 66, 80
- telecom applications, 144
- telecommunications, 65
 - fibers, 295
- tellurium, 125
- TE mode, electric field profiles, 86
- temperature gradients, 371
- temperature gradients, important values in splicing region and, 371
- temperature measurements, 356
- temporal decay of cavity mode, 45
- temporal delta-function-like initial condition, 36
- temporal Fourier spectrum, 36
- temporal variation, for QD, 40
- temporal variation, in emission intensity of GaAs QDs, 41
- TE polarization, 148, 175
- terrestrial optical links, 320
- testing, of emulsion, 413
- tetraethyl orthosilicate (TEOS)
 - sol-gel chemistry of, 493
- theoretical analysis, 76
 - bending loss, 78
 - dispersion relation, 76
- theoretical and experimental result, of group index $n_{\text{sub}}/n_{\text{sub}}$, 78
- theoretical number of electrons per photon, comparison of, 346
- thermal annealing, 109
- thermal conductivity, 348, 445
 - coefficient, 361
- thermal diffusivity, 361
- thermal distribution, 371
- thermal durability, 56
- thermal emission, 51, 52, 57, 282
 - from 3D self-assembled photonic crystal, 56
 - from photonic crystals, 51, 52, 53
 - spectrum, 51
- thermal emitters, 51
- thermal insulation, 361
- thermal loss, 286
- thermal mass minimization, 283
- thermal nanoimprint, 270
- thermal stress, 360, 371
- thermoelectric cooler, 314
- thermo-optic effect, 356
- thermophotovoltaics, 339
- thiacyanine, 66
- thick grating, 147
- thin grating, 147
- thin-layer control, 392
- thin-layer deposition, 392
- thin $\text{Mg}_{\text{sub}1}/\text{subTisub}1-\text{y}/\text{sub}$ film
 - pressure vs. optical transmission isotherms, 462
- thin Pd
 - in metal and hydride state, 454
- thin residual film, 253
- third-order reflection, 165
- three-axis micromotion, 387
- three-dimensional finite difference time domain (3D-FDTD) method, 274
- three-dimensional photonic crystal
 - intermediate reflector, 343
- threshold effect, 386
- threshold excitation energy, 496
- threshold photon energy, 346
- time multiplexing, 13, 144
- time-resolved reflectometry, 356
- TIR-based liquid-level detection system, 476
- TIR-based probes, 486
- TIR point liquid sensor, 477
- Titanium sapphire laser, 387
- TM mode transmission spectra, 87
- TO-can. *see* transistor outline can
- tomographic diffractive microscopy (TDM), 426, 434, 435, 438
 - dual imaging mode, 435
 - by illumination variation, 434
 - image of diatoms, 435
 - longitudinal resolution, 436
 - optical transfer function, 436
 - phase microscopy, limits of, 433
 - principle, 435
 - by specimen rotation, 436
 - tapered optical fiber, 438
 - technique, 439

- tomographic representation of, measured two-photon state, 119
- tomography
 - by illumination rotation, 437
 - with illumination rotation, 437
 - with specimen rotation, 437
- top-down microfabrication techniques, 107
- Torr beam equivalent pressure, 109
- tortuosity, 374, 377
- tortuosity vs. diffusion coefficient variation, 376
- TOSA. *see* transmitter optical subassembly
- total electric field in the hologram region, 175
- total internal reflection, 474
- total internal reflection (TIR), 399, 458, 474
 - critical angle, 475
 - principle, 475
- total reflection, 295
 - dielectric guiding mechanism, 297
- transfer matrix
 - approach, 193
 - equation, 211
- transistor outline can, 314
- transition cascade, 105
- transition SHA, 95
- transmission characteristics, 89
 - hole arrays, 89
 - nanoslit arrays, 91
- transmission coefficients, 161, 165
- transmission diffraction gratings, 176
- transmission electron microscopy (TEM), 235, 414
 - image and schematic of a Au nanorod decorated with Si QDs, 236
 - image of a Au NP-Si QDs nanocomposite, 234
 - image of Au-doped nanofibers, 240
 - image of composite NPs, 239
 - image of nanocomposite, 235
 - image of Si QD-Au core-shell composite NP, 237
 - image of Si QD-Au NP composite, 237
 - image of Si QD micelle core-Au shell nanocomposite, 241
 - images, and size distributions of Au NP cores of Si QD-Au composite NPs, 238
 - images F127-COOH-encapsulated Si QDs, 241
 - images of emulsion, 415
 - images, of ethyl-undecylenate-terminated Si QDs, 241
 - images Si-Au hybrid nanostructure, 241
- transmission microscope, 426
- transmission phase, 82, 95
 - control, 82
 - by stacked metal-dielectric hole array, 92
 - experimental confirmation of transition, 13, 97
 - experimental confirmation of uniform, 12, 95
 - verification of, 12, 93
 - wavefront formation, 95
 - control element, 92
- transmission properties
 - diagrammatic representation, 83
- transmission silica fiber, 312
- transmission spectra, 94
 - of triangle lattice of circle shape, 277
 - triangle lattice of triangle shape, 277
- transmission spectrum, 29
 - of notch filter, 30
- transmittance
 - of notch filter, 30
 - peak, 276
 - spectra, 91
- transmitted linear polarization, 266
- transmitted phase, 96
- transmitted signal, 292
- transmitted wave (T), 158, 176
- transmitter optical subassembly, 314
- transparent dielectric materials, 29
- transport equation, 360
 - in porous media, 373
- transverse electric (TE), 85
- transverse magnetic (TM), 85
- transverse size-to-wavelength ratio, 296
- traveling wave amplifier, 312
- triangular lattice, of circular air cylinders in the thin film, 37
- triethylgallium (TEGa), 127
- tunable elements, 144
- tunable micropatterned colloid crystal lasers, 489
 - CC gel films stabilized by ionic liquid, 498
 - laser action from CCs with light-emitting planar defects, 495
 - light-matter interactions, 489
 - micropatterned laser action from CCs by photochromic reaction, 498
 - photonic crystals(PC), 490
- tungsten halogen lamp, 281
- TWA. *see* traveling wave amplifier
- two-dimensional hole array (2DHA), 81
- two-dimensional scanning, 385

- two-dimensional spatial distribution, 128
two-mode solution, 14, 160
– for incidence at the Bragg angle, 162, 163
- u**
- ultrafine-grain materials, 404
ultrafine-grain silver halide emulsions, history of, 406
ultrarealistic 3D images, 403
ultrarealistic holographic images, 403
ultrarealistic image, 403
ultrashort pulsed laser, 385, 393
– advantages, 387
ultrasmall angle x-ray scattering (USAXS), 514
ultrasonic cleaning, 273
ultrathin Mg film, 462
ultrathin polarizers, 254
ultrathin waveplates, 262
– from SMDM, 261
– of stratified metal-dielectric MMs, 15, 259
ultraviolet (UV), 270, 385, 472
– irradiation, 236
– light, 271
undetermined coefficients, 165
uniaxially oriented opal film, 517
unidirectional invisibility, 146, 147
unidirectional nonparaxial invisibility of purely reflective PT-symmetric volume gratings, analysis of, 173
unslanted grating, 159
upconversion, 17, 339
– principles, 339
US Department of Energy specification, 447
UV. *see* ultraviolet
UV-NIL technology, 282
– for fabricating plasmonic devices using the nanoperiodic structure of, 285
UV-VIS-NIR spectrometer, 512
- v**
- vacuum fluctuation, 293
vapor to liquid (V-L) response time, 480
VCSEL. *see* vertical cavity surface emitting laser
vertical cavity surface emitting laser, 307
viscosities, 270
visualization of photoelasticity, using cross polarization, 357
volatility, of NIAC monomer, 272
volume holograms, 143
- w**
- water surface tension, 482
water test, signal output, 482
- wave attenuation, 147
wave equation, 42, 146, 175
– system of coupled, 159
wavefront sensor, 433
wave function, 33, 115, 345
waveguide, 146, 173, 399
– based photonic circuits, 65
– technologies, 65
– writing, 384, 399
– – process, 399
wavelength, 149, 385
– division multiplexing, 302, 315
– – access networks, 321
– in free space, 39
– multiplexing, 294
– roles, 385
– selectivity, 152
– threshold, 334
wavelength-independent reflection
vs. wavelength-selective reflection, 307
wave number, 335
wave plate, 112
wave propagation, 211
wave vector, 33, 77, 174, 335
welding, 361
Werner line, 120
Werner state, 119
wettability control, 397
white noise, 293
wire-grid array, 81, 86
wireless communication system, 322
wiring technique, 321
W_{Osub3/sub} refractive index, 463
- x**
- XPM. *see* cross-phase modulation
XX→X transitions, 105
- y**
- Yablonovitch limit, 338
Ytterbium-doped laser, 387
yttrium, 461
- z**
- ZBLAN glasses, 304
zero average loss/gain factor, 156
zero eigenfrequency, 43
zero-order Bessel functions, 363
zero-order diffraction, 155
zero-point field spectral density, 293

- zeroth diffractive orders in transmission, and reflection, 177
- zeroth-order diffraction, 162
- zeroth-order reflection
 - coefficients, 161
- zeroth-order transmission, 167
 - amplitude, 162
- zero time delay, 137
- zinblende lattice, 130
- ZZZyclopsTM equipment, 418