

Index

a

- absolute densities, of H atoms 87
- absolute density calibration 55
- absolute pulse energy 53
- acrylates 191, 198, 201, 217
- active-matrix liquid crystal displays 319
- adsorbed volume 189
- alkynes 201
- alternative current (AC) voltages 22
- aluminum (Al) electrodes 326
- aluminum-gallium-arsenide (AlGaAs) layer 321
- aluminum-gallium-nitride (AlGaN) 322, 323
- aluminum-nitride (AlN)
 - buffer layer 323
 - films 5
 - preparation, Cat-CVD 168–170
- aluminum oxide (Al₂O₃) preparation, Cat-CVD 166–168
- ambipolar diffusion coefficient 121
- 3-aminopropyltrimethylmonomethoxysilane (3-AMS) 228
- 4-aminostyrene 198, 217–219
- ammonia (NH₃) 5, 12, 144, 330
- amorphous semiconductor alloys 297
- amorphous-silicon (a-Si) 7, 105
 - a-Si:H/a-Si:H stacked cells 296
 - band structure, of amorphous materials 106–109
 - and c-Si hetero-junction solar cells 312–314
 - deposition mechanism, growth model 125–131
 - deposition rates 250
 - device-quality 105–106
 - films 3, 22, 77
 - fundamentals of preparation
 - deposition parameters 115
 - infrared absorption 115–117
 - general properties
 - a-Si solar cells 109–115
 - crystalline semiconductors 109
 - hydrogen (H) atoms 109
 - PDS 113
- amorphous-silicon-germanium (a-SiGe) alloy solar cells 297–301
- films 5
- amorphous silicon solar cells 296–297
- amplified spontaneous emission (ASE) 59
- angle-resolved high resolution N1s X-ray photoelectron spectroscopy (ARXPS) 223
- anisotropy, of fluorescence 47
- anodized aluminum oxide (AAO) 211, 227
- areal collision frequencies 18
- atomic and molecular spectroscopy, symbols used 67–68
- atomic force microscopy (AFM) 184, 371, 378
- atomic layer deposition (ALD) 180, 215, 232, 329, 335
- atomic radicals, by one-photon LIF 47
- Auger electron spectroscopy (AES) 82, 164

- average velocity 12
 azimuthal quantum number 55
- b**
- band gap 107, 110, 113–115, 120, 121, 139, 168, 214, 235, 296–300, 302, 305, 317, 364
 band structure 106–109, 111
 Beer–Lambert law 56, 61, 63
 borazane (H_3NBH_3) 94
 boron (B) doping 105, 398–401
 Brunauer–Emmett–Teller (BET) adsorption isotherm 189
 buffered hydrofluoric acid (BHF) 148, 149, 155, 316
- c**
- capacitance (C)-voltage (V) measurements 363–364
 carbon or molybdenum suscepter 21
 carboxylic acid ($-\text{COOH}$) group 224
 carburization 156, 266, 278, 280
 catalytic chemical vapor deposition (Cat-CVD) 1, 3, 21
 amorphous-silicon (a-Si)
 band structure, of amorphous materials 106–109
 dangling bond (DB) 123
 deuterium (D_2) gas 119
 device-quality 105, 106
 fundamentals of preparation 115–117
 general properties 109–115
 application 335
 atomic composition 170
 chamber
 catalyzer surfaces–catalytic reactions 82–83
 gas temperature distribution 85–86
 molecules in 77–80
 vs. PECVD, for decomposition 80–81
 surface area of catalyzer 81
 surface decomposition processes 83–85
 chamber cleaning 281–283
 collisions, at chamber wall 18–19
 collisions, with solid surface 17–18
 density of molecules, and thermal velocity 11–13
 gas flow
 dissociation probability, of SiH_4 251–253
 long cylindrical chamber, for quasi-laminar flow 249–251
 gas-phase diagnosis techniques 42
 history and technology 4–6
 hydrogen content (C_{H}) 118
 infrared absorption spectra of 159
 laser spectroscopic techniques 58
 CRDS 60–62
 REMPI 59–60
 TDLAS 63
 mean free path
 diameter of molecules 15
 diameter of molecules, estimation 14
 equation 13
 examples 15–16
 interval time, b/w first and second collision 16
 one-photon laser-induced fluorescence
 absolute densities, estimation of 53–55
 anisotropy, of fluorescence 47
 apparatus 49–51
 general formulation 43–45
 non-radiative decay processes, correction 47–48
 rotational and vibrational state distributions 52–53
 spectral broadening 48–49
 two-state system, assumption of 45–46
 vs. PECVD apparatuses 20–21
 radical detection techniques 42–43
 radical species 41–42
 residence time of species, in chamber 19–20

- single-path VUV laser absorption 56–58
- Si film formation mechanisms 96–98
- two-photon laser-induced fluorescence 55–56
- catalytic cracking 3
 - reactions 2
 - system 344
- catalytic decomposition
 - B₂H₆ and B₂H₆/H₂ and succeeding gas-phase reactions 93–94
 - of diatomic molecules H₂, N₂, and O₂ 86–88
 - H₂O 89
- catalyzing wires 266
 - silicide formation, of W catalyzer 266–273
 - Ta catalyser (TaC)
 - lifetime extension 276–277
 - and method 275
 - W catalyzer, in carbon containing gases 278–280
- Cat-chemical-sputtering 372–374
- Cat-CVD Si films 134
- Cat-CVD SiNx films 144, 145, 147, 148, 150–154, 263, 321, 322, 324, 325, 328
- Cat-CVD SiOxNy films 158, 160
- Cat-doped phosphorus (P) 385, 386, 388–392
- Cat-doping
 - into a-Si 401–402
 - to hetero-junction solar cells 406–407
 - invention 378–379
 - mechanisms
 - diffusion enhancement, by H atoms 392–394
 - Si modified surface layer model 397–398
 - vacancy transportation model 394–397
- Cat-nitrided crystalline–silicon (c-Si) 367
- Cat-nitridation layer, on
 - crystalline-silicon substrate 368, 369
- Cat-nitridation, Si and GaAs 365–372
- Cat-oxidation 360–366
- Cat-sputtering 373
- cavity ringdown 43, 58, 60–63, 85
- C contaminated layer 351
- chamber wall 11, 13, 17, 19, 24, 34, 77, 79, 88, 97, 98, 252, 256, 260, 273, 281, 282, 286, 343, 345–348, 355, 378
- characteristic energy, of Urbach tail 121
- coefficient of friction (COF) 181, 184, 185
- coefficient of thermal expansion (CTE) 206
- coherent anti-Stokes Raman scattering (CARS) 67, 85
- complimentary error function (erfc) 387, 388
- constant photoconductivity method (CPM) 296
- contamination
 - of catalyzing materials 261–262
 - flux density of impurities emission 265–266
 - from other impurities 262–263
- continuous-wave (CW) lasers 45, 49, 60
- conventional W wires 263, 264
- copolymerization, of styrene monomer 217
- covalent bond radius 14, 15
- critical nucleus 135, 136
- crystalline fraction F_c 134
- crystalline silicon (c-Si)
 - Cat-CVD poly-Si 135, 136
 - critical nucleus 136
 - poly-crystallized Si films 137
 - properties 138–141
 - TEM 136
 - film 308
 - growth of 132–134
 - p-n junction devices 105

- crystalline silicon (c-Si) (*contd.*)
 Si crystal-growth 141–143
 wafers 2, 308, 309
- crystalline silicon (c-Si) solar cells 306
 Cat-CVD silicon-nitride
 (SiN_x)/amorphous-silicon (a-Si)
 stacked passivation 307–310
 Cat-CVD silicon-nitride
 (SiN_x)/amorphous-silicon (a-Si)
 stacked passivation, textured c-Si
 substrates 310–311
- current density–voltage characteristics
 301
- cyclohexyl methacrylate (CHMA) 188,
 189, 201
- cylindrical chamber wall 251
- d**
- dangling bonds (DBs) 98, 109, 121,
 123, 124, 126, 312, 314
- dark-conductivity (σ_d) 110, 121–123,
 286, 296, 297
- decomposition mechanisms
 catalytic decomposition
 B₂H₆ and B₂H₆/H₂ and succeeding
 gas-phase reactions 93–94
 of diatomic molecules H₂, N₂, and
 O₂ 86–88
 HMDS 94–96
 H₃NBH₃ B atoms release from
 boronized wires 94
 H₂O 89
 methyl-substituted silanes 94–96
 molecules, on metal wires 96
 NH₃ and succeeding gas-phase
 reactions 90–91
 PH₃ and PH₃/H₂ and succeeding
 gas-phase reactions 92–93
 SiH₄ and SiH₄/H₂ 89–90
 succeeding gas-phase reactions
 92–93
- decomposition modes, of SiH₄
 molecules 83
- density of states (DOS) 108
- deposition, a-Si by Cat-CVD 79, 116
- deposition down system 77
- deposition of AlN by Cat-CVD 169
- deuterium (D₂) gas 119
- diamond crystalline structure 107
- diamond like carbons (DLC) 4
- di- and triatomic hydride radicals 46
- diborane (B₂H₆) gas 377
- dichlorosilane (DCS) 150
- Diels–Alder reactions 198, 202
- difluorocarbene 182
- diode type apparatus 20
- direct current (DC) voltages 22
- divinylbenzene 217–219
- divinyl benzene (DVB) 198, 205, 208,
 217–219
- Doppler broadening 48
- e**
- electron cyclotron resonance (ECR)
 356
- electron energy distribution function
 (EEDF) 27
- electron energy probabilistic function
 (EEPF) 27
- electronic spin angular momentum 68
- electron probe micro-analysis (EPMA)
 269, 270, 399
- electron spin resonance (ESR) 124, 184
- electro-static chucking (ESC) 258, 259
- Eley–Rideal (E-R) mechanism 191
- excitation laser 47
- external quantum efficiency (EQE)
 spectra 299, 300, 313
- extreme ultra-violet (EUV) lithography
 350
- f**
- Fe evaporation, from W filament 263
- field effect transistor (FET) 322
- film uniformity
 film thickness 254–255
 geometrical relation, catalyzer vs.
 substrates 253–254
- Fineman–Ross copolymerization
 equation 193
- fluorinated a-Si (a-Si:F) 3, 109
- fluorine (F) atoms 3
- flux density, of precursors 254

- Fourier transform infrared (FTIR) 182, 184, 186, 330
- g**
- GaAs-based high electron mobility transistor (HEMT) 320–322
- gallium-arsenide (GaAs) 33, 143, 320, 322
- high frequency transistors 5
- gallium-nitride (GaN) 365
- blue emission diodes 168
- gas barrier films
- food packages 332–335
- inorganic gas barrier films 325–328
- inorganic/organic stacked PSC 328
- TBPO 330
- WVTR 329
- gas-phase composition of stable molecules 66–67
- glow discharge method 22
- glycidyl methacrylate (GMA) 203–205, 231, 330
- gold nanoparticles (GNPs) 224, 226
- ground-state H atoms 55, 56
- Grove–Deal model 368
- h**
- Hall mobility 381
- H, B, and Si atoms 60
- H-cleaning system 351
- Henry's law 190, 193
- hexafluoropropylene oxide (HFPO) 6, 182, 186–188
- hexamethylcyclotrisiloxane 201
- hexamethyldisilazane (HMDS) 95–96, 144, 155, 332
- high density H atoms
- cleaning and etching
- carbon contaminated surface, cleaning of 350–351
- crystalline silicon, etching of 348–350
- generation 343–345
- H atoms, transportation of 346–347
- photo-resist removal 351–356
- high electron mobility transistor (HEMT) 320–322
- hollow cathode discharge 32
- hollow cathode system 32, 33
- homopolymerization 220
- homopolymer polystyrene (PS) 217
- hot filament CVD 3, 6
- hot-wire CVD (HWCVD) 3, 5, 7, 180
- H-terminated a-Si surface 126
- hydride radicals 60
- hydro-chloride (HCl) based chemicals 369
- hydro-fluoric acid (HF) solution 155, 362
- hydro-fluorinated a-Si (a-Si:F:H) 5
- hydrogenated & fluorinated a-Si (a-Si:F:H) 109
- hydrogenated microcrystalline silicon ($\mu\text{c-Si:H}$) 297, 302
- hydrogen gas (H_2) 343
- hydrogen molecules (H_2) 3, 12
- hydrogen peroxide (H_2O_2) solution 311, 389
- hydroxyethyl methacrylate (HEMA) 202, 209
- i**
- incubation time 135, 136, 141, 319
- indium-gallium-arsenide (InGaAs) 321
- indium–tin oxide (ITO) 297
- inductively coupled plasma (ICP) apparatus 20
- infrared (IR) absorption 115, 117, 145
- initiated (*i*) chemical vapor deposition (*i*CVD) 3
- acrylates 198
- alkynes 201
- 4-aminostyrene 217–219
- crosslinkers 201
- divinylbenzene 217–219
- EGDA and EGDMA 219
- interfacial engineering, adhesion and grafting 227–229
- mechanistic principles
- conformality 193–194

- initiated (*i*) chemical vapor deposition (*i*CVD) (*contd.*)
- copolymerization 191–193
 - deposition rate and molecular weight 191
 - initiators and inhibitors 188–189
 - monomer adsorption 189–190
 - responsive organic films 198
- methacrylates 198
- nitrogen-containing iCVD monomers 202
- perfluoroalkyl functional groups 205–208
- PGMA, properties and applications 203–205
- PHEMA and copolymers 208–212
- reactors, for synthesizing organic films 230–232
- responsive films 202
- styrene 217
- styrenes 201
- in situ* modification, of the substrate 229
- integrated circuits (IC) 1, 143, 201, 205, 321, 358
- ion attachment mass spectra 96
- ion-attachment mass spectrometry 66
- k**
- Kelen–Tudos plots 193
- kinetic energy of electrons 26
- l**
- laser-induced fluorescence 42–56, 182
- layer-by-layer (LBL) deposition 180
- light responsive iCVD layers 223, 224
- Lindhard–Scharff–Schjott (LSS) theory 28
- linker-free grafting 228–230
- liquid crystal displays (LCDs) 1, 21, 106, 284, 314
- liquid phase epitaxy (LPE) 130, 133
- lithium fluoride (LiF) 51
- lithographic patterning 224
- LMM Auger electron 370
- long life catalyzer, in iCVD 280–281
- low energy electron diffraction (LEED) 82
- lower critical solution temperature (LCST) 224, 227
- low temperature boron (B) doping, into *c*-Si 398–401
- low temperature chemical vapor deposition (LPCVD) 324, 325
- low temperature formation, of low resistivity metal lines 358–360
- low temperature Si epi-growth 141
- low vapor pressure 115
- m**
- magnesium fluoride (MgF₂) 51
- mass-production machine
- apparatus, for large area deposition 284–287
 - coating, of PET bottles 287–288
 - in compound semiconductors 283–284
 - prototypes 288–289
- mass-production systems 266
- mass spectrometric techniques 42
- ion-attachment mass spectrometry 66
 - photo-ionization mass spectrometry 64
 - threshold-ionization mass spectrometry 64–66
- material gas molecules 42
- Maxwell distribution 12
- mean free path
- diameter of molecules, estimation 14–15
 - equation 13
 - examples 15–16
- microelectrical and mechanical system (MEMS) devices 204
- metal-oxide semiconductors, by H atoms 357
- metal-oxide-silicon (MOS) 323
- metal-oxides, reduction 356–357
- methacrylates 198, 202, 217
- methane (CH₄) gas 4

- micro-crystalline silicon ($\mu\text{c-Si}$) 5, 6, 132
- microcrystalline silicon solar cells 302, 303
- microwave photo-conductivity decay ($\mu\text{-PCD}$) method 404
- molecular beam epitaxy (MBE) 130, 133, 136
- molecular layer deposition (MLD) 180
- monochromator 43, 45, 49, 57
- monolithic microwave integrated circuits (MMIC) 323
- monomer adsorption 189–190
- $\mu\text{c-Si}$ or poly-Si films 132
- n**
- nanoadhesion 204
- nano-crystalline silicon (nc-Si) 132
- nascent decomposition products 97
- National Renewable Energy Laboratory (NREL) 118
- n*-butyl methacrylate (nBMA) 201
- negative bias temperature instability (NBTI) 324
- neopentyl methacrylate (neoMA) 201
- nichrome (NiCr) filaments 186
- nickel-chrome (NiCr) wires 6
- nitrogen-containing iCVD monomers 202
- nitrogen tri-fluoride (NF_3) 33, 282
- non-radiative decay processes 47–48, 53
- nuclear magnetic resonance (NMR) spectra 203
- nuclear stopping power 36
- o**
- octamethylcyclotetrasiloxane 201
- one- and two-photon laser-induced fluorescence 43, 55–56
- one-photon laser-induced fluorescence
absolute densities, estimation of 53–55
anisotropy, of fluorescence 47
apparatus 49–52
general formulation 43–45
- rotational and vibrational state distributions 52–53
- spectral broadening 48–49
- two-state system, assumption of 45–47
- o*-nitrobenzene moieties 224
- open circuit voltage (V_{OC}) 307
- O-plasma ashing 352
- optical absorption constant 111, 113
- optical band gap 110, 120, 121, 297
- optical microscopy (OMS) 273
- organic electroluminescent displays 1
- organic light emitting diode (OLED) 314, 325–328
- organic polymer synthesis, Cat-CVD
iCVD, mechanistic principles
conformality 193–194
copolymerization 191–193
initiators and inhibitors 188–189
monomer adsorption 189–190
- PTFE synthesis 181, 182
catalyzing materials, PTFE
deposition 186–187
characteristics and applications, of
CVD PTFE Films 182–186
- organosilazanes 212–217
- organosilicon polymers 212, 214, 216
- outputs in ultraviolet (UV) 42
- oxygen content (C_O) 138
- oxygen (O) plasma 351
- oxygen (O)-related radicals 360
- p**
- packing density, of catalyzing wires 255–256
- parabolic rate constant 269, 271, 275
- patterned thin films 3
- 1,1,3,5,5-pentamethyl-1,3,5-trivinyl-trisiloxane (TVTISO)
214

- perfluoroalkyl functional groups 205–208
 - perfluorooctanesulfonyl fluoride (PFOSF) 188
 - perfluorooctanoic acid (PFOA) 182
 - perhydropolysilazane 346
 - perovskite solar cells (PSCs) 328
 - phosphine (PH₃) 377
 - phosphorus (P) doping 105, 380–398
 - photo-chemical vapor deposition (Photo-CVD) 2
 - photo-deflection spectroscopy (PDS) 113
 - photo-ionization mass spectrometry 64
 - photomultiplier tube (PMT) 45
 - photovoltaics (PV) 296
 - pH-responsive iCVD films 227
 - piranha solution 311
 - plasma-damage-free deposition system 3
 - plasma enhanced chemical vapor deposition (PECVD) 3, 21
 - collisions 36
 - density of, decomposed species
 - collision b/w, electrons and gas molecules 25–26
 - number of, decomposed species 26–28
 - drawbacks
 - increase of, frequency 30–31
 - large area uniformity, film deposition 31–33
 - overcoming 33–35
 - plasma damage 28–30
 - power transferring system 31
 - fundamental features
 - DC plasma to RF plasma 23
 - history 21
 - plasma generation 22
 - sheath voltage 24–25
 - plasma enhanced CVD (PECVD)
 - fluoropolymers 184
 - polarity of electrodes 23
 - polybutyl acrylate (PBuA) 192
 - poly-crystalline silicon (poly-Si) 5, 85, 98, 132, 306, 319
 - film prepared 373
 - polydimethylsiloxane (PDMS) 204
 - polydispersity index (PDI) 191
 - polydivinylbenzene (PDVB) 189
 - polyethylene dioxythiophene (PEDOT) 218
 - polyethylene oxide (PEO) 189
 - polyethylene terephthalate (PET) 164, 332
 - polyglycidal methacrylate (PGMA)
 - polymer layer 330
 - properties and applications 203–205
 - polyhydroxyethylacrylate (PHEMA) 208, 210, 212
 - polyionic iCVD films 221–222
 - poly-L-lysine (PLL) 217
 - poly-Si films 132–134, 138–141, 320
 - poly-Si TFT 319–320
 - polystyrene (PS) 189
 - polytetrafluoroethylene (PTFE) 6, 34, 181, 346
 - positive-tone Novolak 352
 - power transferring system 31
 - pressure cooker test (PCT) 150, 151, 154
 - 1,3-propanediol [HO(CH₂)₃OH] 359
 - 1,3 propane sultone (PS) 222
 - proto-crystalline network 297
- q**
- quasi-laminar flow 249–251
- r**
- radio frequency (RF) 20, 23, 27, 260
 - radio-frequency plasma enhanced chemical vapor deposition (RF-PECVD) 27
 - power transfer system 31
 - Raman measurement 134
 - rapid thermal annealing (RTA) 364
 - ratio of photoconductivity (σ_p) 110, 121, 123, 296, 297
 - Rayleigh scattering 46, 53, 54

- RCA cleaning process 362
- reactive monomers 202
- recombination reactions 182, 345
- refractive index (RI) 54, 144, 147, 148, 151, 157, 158, 160, 163, 181, 201, 214
- relative densities 46
- relative humidity (RH) 210, 331
- relative populations 45
- resonance-enhanced multiphoton ionization (REMPI) 43, 56, 59–60
- ring-opening polymerization 189, 201–202, 214
- root mean square (RMS) 371, 378
- rotational and vibrational state distributions 52–53, 67
- Rutherford backscattering (RBS) 147, 160, 261, 361, 367
- S**
- sample face up system 77
- scanning electron micrographs 194
- scanning electron microscope (SEM) 30, 154, 267, 273, 305, 310, 325, 373
- scanning transmission electron microscope (STEM) 29, 30
- secondary ion mass spectroscopy (SIMS) 137, 261, 378
- semiconductor lasers 322–323
- shallow doped layer
- Cat-doped impurities, by SIMS 383–388
 - Cat-doped P atoms 389–392
 - diffusion constant 388–389
 - electrical properties of 380–383
- sheath voltage 24–25, 29, 35, 37
- sheet carrier density, of phosphorus (P) 381–384, 390, 391
- silacyclobutane 64
- silane (SiH_4) gas 4, 12
- silicide formation
- of Ta catalyzer 273–274
 - of W catalyzer 266–273
- silicide formation, carburization of W surface 274–275
- silicon (Si)
- atoms, desorption of 84
 - devices 377
 - hetero-junction (SHJ) solar cell 405–407
- silicon-di-fluoride (SiF_2) molecules 3
- silicon dioxide (SiO_2) 164, 346, 380
- by Cat-CVD 165
 - films 143
 - films preparation, Cat-CVD 164–165
 - layers 2, 360
- silicon heterojunction (SHJ) solar cells 312
- silicon-nitride (Si_3N_4 or SiN_x) 4, 12, 22, 143–157, 324, 365
- from HMDS 155–157
 - from mixture of NH_3 , SiH_4 and H_2 150–153
 - from NH_3 and SiH_4 mixture
 - BHF 148
 - deposition rate 144
 - refractive index, of film 147
 - thermal velocity 145 - preparation of 144
 - refractive index of 146
 - usefulness of 143
- silicon-oxy-carbide (SiO_xC_y) 332
- silicon-oxy-nitride (SiO_xN_y) 326, 365
- Cat-CVD 158
 - properties of, preparation 157–164
- Si modified surface layer model 397–398
- single-path vacuum ultraviolet (VUV) laser absorption 56–58
- single-photon ionization (SPI) 64, 65, 95
- mass spectra 95
- solar-blind photomultiplier tube (PMT) 51
- solar cells
- amorphous silicon-germanium alloy solar cells 298, 299, 301

- solar cells (*contd.*)
 - amorphous silicon solar cells 296–297
 - nanostructured solar cells 304–306
- Staebler-Wronski effect 123
- stainless-steel (SUS) 263
 - cylindrical chamber 343
- state-of-art solar cells 5
- Stefan Boltzmann constant 256
- stoichiometric SiNx films 155
- styrenes 198, 201, 217
- succeeding gas-phase reactions
 - H₃NBH₃ B atoms release from boronized wires 94
 - NH₃ and succeeding gas-phase reactions 90–91
 - PH₃ and PH₃/H₂ and succeeding gas-phase reactions 92–93
 - SiH₄ and SiH₄/H₂ 89–90
- surface decomposition processes 83–85
- surface potential control, by Cat-doping realizing high quality passivation 403–405
- surface recombination velocity (SRV) 307
- synchrotron radiation 43

- t**
- Ta-alloys 115
 - lifetime extension 277–278
- Ta catalyser (TaC)
 - lifetime extension 276–277
 - Ta-alloys, lifetime extension 277–278
- Tandem cells 296, 297, 299, 302, 303
- Tantalum (Ta) 83, 115, 273, 313, 330
- Tantalum-Carbide (TaC) 253
- Tauc relation 112, 113
- teflon 6, 34, 181
- temperature programmed desorption (TPD) 82
- terminal silicide layers 266
- tert-amyl peroxide 188
- tert-butyl peroxide (TBPO) 188, 189, 330
- tert-butyl peroxybenzoate (TBPOB) 188, 189
- tetrafluoroethylene (TFE) 6, 34, 181, 182, 346
- 1,3,5,7-tetravinyl-1,3,5,7-tetramethyl-cyclotetrasiloxane (V4D4) 212
- thermal chemical vapor deposition (thermal-CVD) system 82, 276
- thermal gradient 16
- thermally responsive iCVD hydrogels 224–227
- thermal radiation
 - from catalyzing heaters 258
 - control of, substrate temperatures 257–260
 - in CVD systems 260–261
 - fundamentals 256–257
- thermal velocity, of gas molecules 12
- thin film coating 1
- thin film technologies
 - LCD 1
 - PECVD 3
 - Photo-CVD 2
- thin-film transistor-based organic flash memories 221
- thin film transistors (TFT) 5, 105, 138, 284, 314
 - amorphous silicon (a-Si) TFT features 314–316
 - PECVD a-Si TFT 316–319
- third-harmonic generation (THG)
 - techniques 59
- threshold energy 27, 28, 36
- threshold-ionization mass spectrometry 64–65
- threshold voltage instability (ΔV_t) 314, 318
- threshold voltage shift (ΔV_{th}) 314, 315, 324
- total angular momentum 45, 47, 50, 51, 53, 54, 68
- total reflection X-ray fluorescence (TRXF) 261, 354
- Townsend's first ionization coefficient 22

- Townsend's ionization coefficients 22
 Townsend's second ionization coefficient 22, 23
 transmission electron micrograph 226
 transmission electron microscope (TEM) 15, 29, 136
 transverse optical (TO) 134
 trichorovinyl silane (TVS) 228
 10,12-tricosanoic acid (TDA) 223
 triethylamine (TEA) 188
 trifluoroacetyl fluoride 182
 tri-methyl-aluminum (TMA) 5, 166, 280
 1,3,5-trivinyl-1,3,5-trivinyltrimethyl-cyclotrisilazane (V3D3) 212
 tunable diode laser absorption 43, 58, 63, 67
 tungsten (W) catalyzer 12, 343, 399
 two-photon excitation technique 56
 two-photon laser induced fluorescence (LIF) 42, 55–56, 343
 two-photon polarization 59
- u**
- ultra high frequency transistors, passivation 322
 ultra-large scale integrated circuits (ULSI) 1, 21, 295
 application 323–325
 ultrathin and conformal iCVD PTFE films 185, 217, 234
 Urbach tail 110–114, 121
 Urbach tail energy (E_u) 111
 UV absorption spectroscopy 182
- v**
- vacancy transportation model 394–397
 vacuum ultra-violet (VUV) laser
 absorption 42, 43, 343
 single-photon ionization technique 64
 variable angle spectroscopic ellipsometry (VASE) 184
 vertically aligned carbon nanotube (VACNT) 218, 227
 very high frequency (VHF) 23
 vinyl monomer cyclohexyl methacrylate (CHMA) 188
 vinylsilane ($\text{SiH}_3\text{-CH-CH}_2$) 332
 volatile hydrogenated species 348
- w**
- water contact angle (WCA) 185, 206
 water vapor transmission rate (WVTR) 163, 328
 wavelengths, detect radicals by CRDS 63
 W catalyzer, in HMDS 156
 W contamination 161, 262, 366
 W-oxide 360
 W-silicide 83, 266, 269, 271, 274, 275
- x**
- X-ray diffraction (XRD) 132, 156, 184, 278
 spectrum, of Si film 133
 X-ray photoelectron spectroscopy (XPS) 147, 148, 184, 225, 356, 363, 367, 368, 370–372
- y**
- Young's modulus 217
- z**
- ZnO/Ag nanorod substrates 305
 Zwitterionic films 221, 222

