

## Index

### **a**

ABC transporters, 110  
 2-acetyl-6-dimethylaminonaphthalene, 140  
 2-acetyl-6-methylaminonaphthalene, 140  
 acridinium salts, 370  
 ACT. *See* adoptive T-cell therapy (ACT)  
 acyl chlorides, 5  
 adoptive T-cell therapy (ACT), 187  
 adsorption  
     – and change in viscosity, 174  
     – of CO<sub>2</sub> vapors, 105  
     – enhanced, 102  
     – geometries, 2  
     – of ink molecules, 162  
     – lysozyme, 102  
     – physical, 238  
     – protein, 283, 284  
     – of proteins on DNA–gold nanoparticles to facilitate cellular uptake and, 284  
     – selective, 177, 178  
 adsorption–desorption equilibrium, 138  
 AFM images of MEH-PPV self-assembly stripes, 331  
 agglomeration, 9, 100, 277, 406  
 aging time, 138  
 Ag nanoparticles, 387, 388  
 AgNWs/(bPEI/PAA-HA)<sup>\*</sup>50 film, LED bulb, 404  
 AgNWs copolymer, 403–405  
 Ag–TCNQ nanowires, 387, 388, 396, 397  
     – formation mechanism, 387  
     – UV-vis spectroscopy/scanning electron microscopy (SEM), 387  
 aldol reaction, 62  
 alkane polymerization, 6  
 allergens, 163  
 aluminum oxide, 138  
 Alzheimer's β-amyloid peptide, 67

ambient atmosphere n-type semiconductors, 315  
 3-aminophenylboronic acid (APBA), 302  
 ammonia, 102, 249, 250  
 amphiphiles, 33–35  
     – Gemini, 37, 38  
     – self-assembly, 375  
     – supra, 40, 41  
     – thermodynamic properties, 375  
     – triangular, 38–40  
     – typical, 35  
 AMT-based BBB transport systems, 121  
 angiogenesis, 79  
 aniline, 102  
 anisotropy, 144, 281  
 anodic aluminum oxide (AAO), 303  
 anthracene, 370  
 9-anthracenecarboxylic acid, 397  
 3-(anthracen-10-yl)-1-phenylpro-2-en-1-one (APO), 150  
 antibodies-containing transmembrane domains, 304  
 anticancer drug DOX, storage and release processes, 99  
 anticorrosive conductive materials, 401  
 anti-EpCAM-coated Si nanowire (SiNW) substrates, 298  
 antifouling, 401  
 antisense gene regulation, 260  
 APC analogues, 187, 188  
 APC surrogate system, bead-based, 187  
 aquaporins, 70  
 aqueous C<sub>12</sub>E<sub>5</sub> solution, cryo-TEM images, 368  
 astrocytes, 79, 112  
 atomic force microscopes (AFMs), 97, 139, 161, 163, 238, 243, 246, 327, 392  
 atomic layer deposition (ALD) technique, 220  
     – applications, 221

- to control thickness of oxide layer with, 220
- atomic precision, 217, 219, 220, 222
- Au junction
  - I–V curves, 397
  - Au/microrod/Au junction
    - current–voltage (I–V) measurements, 395
  - azide–alkyne “click” reaction, 8
  - azide–alkyne cycloaddition, 6–9
  - reaction, 8
- N*-(4-azidophenyl)-4-ethynylbenzamide, 7
- azobenzene, 42, 54, 370, 392
  - -modified cationic surfactants, 370
  - photoresponsive groups, 370
- b**
- Bacillus subtilis*, 65
- bandgap, 2, 222, 233
- barrier tightness, regulation of, 112
- batteries, 250
- BBB. *See* blood-brain barrier (BBB)
- BCSFB. *See* blood-CSF barrier (BCSFB)
- benzene, 38–40, 45, 102, 104, 141, 371
- 3-(2-benzothiazoly)-7-diethylaminocoumarin (coumarin 6), 151
- benzothiophene derivatives, 326
- BGBC. *See* bottom-gate-bottom-contact (BGBC)
- BGTC. *See* bottom-gate-top-contact (BGTC)
- BGTC-type organic nano-FET device
  - fabrication of, 334
- bimetallic Au–Ag nanowires, 262
- biocompatibility, 46, 59, 77, 115, 120, 124, 172, 182, 261, 280
- biodegradability, 46, 59, 77
- biodiagnostics, 260, 283
- biofunctionalization, 194, 195, 203–205, 209, 212
- biological applications, 176, 177, 402
- biomedicine, 62, 75, 77, 155, 259, 260
- biomimetic lipid membranes, 162, 177, 178
- biomimetic membranes, 176
  - doped with biotin, 179
- bionics, 62
- bio-specific interactions, 101
- biotin, 174, 175, 178, 179
- bipolar organic single-crystal nanobelト transistor, 343
- N,N*-bis(acryloyl)cysteamine, 201
- 1,4-bis(1,2'-6',1''-bis(3-butyl-1*H*-3,4,5-triazolyl)pyridin-4'-yl)benzene nanostructures, 143
- 4,4'-bis((E)-2-(naphthalen-2-yl)vinyl)-1,1'-biphenyl (BNVBP), 311, 313, 343
- bis(iminopyrrole)benzene, 141
- 5,5'-bis(4'-methoxybiphenyl-4-yl)-2,2'-bithiophene (BP2T-OMe), 136
- N,N*-bis(2-phenylethyl)-perylene-3,4:9,10-tetracarboxylic diimide (BPE-PTCDI) nanowires, 323
- N,N*-bis(2-phenylethyl)-perylene-3,4:9,10-tetracarboxylic diimide (BPE-PTCDI) nanowires, 323
- 9,10-bis(phenylethynyl)anthracene (BPEA), 137, 144, 145, 151, 153
- bis(2,4,5-trichloro-6-carbopentoxyphenyl)oxalate (CPPO), 153
- bivalent cation, 179
- block copolymer micellar nanolithography (BCML), 189, 190
- blood–brain barrier (BBB), 109, 120–124
  - cells of neurovascular unit forming, 111
  - drug permeability across, 112, 113
  - endothelial, 110
  - surface functionalization of nanoparticles for, 120–122
  - transport routes across, 112, 113
  - *in vitro* models of, 114, 115
- blood-CSF barrier (BCSFB), 109, 110, 111, 112
  - *in vitro* models, 114, 115
- bolaamphiphiles, 35–37
- bolaform surfactant containing azobenzene, 370
- bone, 79
- boronic acid, 5
- bottom-contact FET device, 334
- bottom-contact-type field-effect transistor
  - source/drain electrodes, structure diagram of, 333
- bottom-gate-bottom-contact (BGBC)
  - advantages, 333
  - device structures of organic nano-FETs, 332
  - disadvantage, 333
  - preparation process, 333
- bottom-gate-top-contact (BGTC)
  - device structures of organic nano-FETs, 332
- bottom-up method, 133
- BPEA wire, 144
- BPE-PTCDI nanowire/thin film-based devices, 348
- brain, 110
- branched poly(ethylenimine) (bPEI), 404
- Br<sup>−</sup> anions, 391
  - cetyltrimethylammonium bromide (CTAB), 391
- bromobenzene, 322
- β-sheet-like structures, 69

**c**

cable-like optical waveguide sensing platform, 154  
 cage-in-fiber-type nanoporous carbon sensor, 103  
 calcite, 374  
 camphorsulfonic acid-doped polyaniline/polyethylene oxide nanofiber, 247  
 capacitors, 1  
 carbohydrates, 118  
 carbon black (CB) nanoparticles, 410  
 carbon nanocage, 102  
 carbon nanotubes, 77, 302  
 carboxyfluorescein (CF)-loaded vesicles, 73  
 carcino embryonic antigen (CEA), 294  
 carrier-mediated transport, 113  
 catalysis, 74, 75, 96, 385, 411  
 catechin, 102  
 C8-BTBT on SiO<sub>2</sub>, 328  
 C4-C-N-PEG9 concentration, 370  
 C<sub>60</sub> crystals, one-dimensional, 320  
 CD. *See* circular dichroism (CD)  
 CDT–BTZ copolymer fiber, 345  
 cell adhesion, 178, 298  
 cell-penetrating peptides (CPPs), 121  
 cell–substrate interaction, 301  
 central nervous system (CNS), 109  
 cerasome, 96–98  
 cerasomes, 96, 97  
 – Lbl films, 97  
 cerebrospinal fluid (CSF), 109–111, 114  
 cerebrovascular unit (CVU), 110, 112  
*N*-cetyl-*N,N*dihydroxyethylammonium bromide (CDHEAB), 363  
 – schematic diagram, 364  
 cetyltrimethylammonium bromide (CTAB), 53, 142, 281  
 – in acetonitrile, 391  
 – Br<sup>–</sup> anions, 391  
 – micelles, 142  
 – thermoresponsive viscoelastic gel, 369  
 cetyltrimethylammonium 3-hydroxynaphthalene-2-carboxylate (CTAHNC), 369  
 C<sub>8</sub>F<sub>17</sub>EO<sub>10</sub> molecular structure, 365  
 C<sub>8</sub>F<sub>17</sub>SO<sub>2</sub>(C<sub>3</sub>H<sub>7</sub>)N(CH<sub>2</sub>CH<sub>2</sub>)<sub>10</sub>H, nonionic fluorocarbon surfactants, 365  
 C<sub>12</sub>Glu–C<sub>12</sub>DMA system, pH-dependent behavior, 364  
 charge transfer complexes, 40, 101, 385  
 – micro/nanostructure conversion, 385–388  
 chemical modification, 110, 296

CH<sub>3</sub>-functionalized self-assembled monolayer (SAM), 322  
 chitosan, 118, 123, 402  
 chlorobenzene, 318–320, 327  
 cholesterol ester, 63  
 cholesteryl-succinyl silane (CSS), 303  
 cinnamic acid, 370  
 circular dichroism (CD), 43, 67, 265  
 circulating tumor cells (CTCs), 293, 294, 306  
*cis*-coordination processes, 223  
 claudins, 110, 112  
 cleavable camptothecin (CPT), 58  
 click chemistry, 262  
 C<sub>m</sub>EO<sub>n</sub> system nonionic surfactant solutions, 364  
 CMK-3 nanochannel, 102  
 coatings  
 – microelectromechanical systems, 373  
 – organic nanoparticles, 115  
 combinatorial biomimetic lipid membranes, 178  
 composite structures  
 – fabricated from synergistic assembly of different molecules, 141, 142  
 compressed CO<sub>2</sub> regulated self-assembled vesicle, 61  
 condensation reactions, 5  
 conducting polymer nanostructures  
 – solution-based synthesis, 234  
 – substrate-based fabrication, 237  
 conductive polymers, 233, 235, 250, 251, 403  
 conductivity, 233, 246, 265, 403, 404, 406  
 – of electrospun conducting polymer nanofiber, 246, 248  
 – measurement, 265  
 – of nanofiber, 247  
 – of polymer nanofiber as function of conducting polymer content, 248  
 copper-catalyzed alkyne–azide cycloaddition, 264  
 copper grid, 339  
 – transmission electron microscope (TEM), 341  
 copper hexadecafluorophthalocyanine (F<sub>16</sub>CuPc), 313, 315  
 copper(I)-catalyzed Huisgen cycloaddition, 262  
 copper phthalocyanine (CuPc), 147, 313, 314  
 – nano field-effect transistor, top-contact, 340  
 – SEM and TEM images, 315  
 – single-crystal nanowire, 339  
 – SO<sub>2</sub> detection, 350  
*p*-coumaric acid, 371

- covalent bonding, 2, 3, 11, 101, 240
- CPs. *See* cyclic peptides (CPs)
- critical size, 133
- cross-linked iron oxide nanoparticles (CLIO), 124
- cryo-TEM images, 368
- aqueous  $C_{12}E_5$  solution at three different temperatures, 368
- crystal growth, 133, 224, 309–314, 317, 323, 325
- crystallization process, 41, 133, 271, 280, 322
- crystal morphology, depends on, 314
- Cu–BMSB–Zn particles, 389
- Cu(II) ions, 389
- $Cu^{2+}$ -mediated nanotubular, 74
- CuPc nanobelt, 314
- CuPc nanocrystal
  - suspension, 335
- CuPc single crystal, 345
- FET devices, 347
- cyclic arginine–glycine–aspartic acid peptide (cRGDfK), 206
- cyclic peptides (CPs), 62, 65, 69, 73
  - nanotubes, 69
- cyclodehydrogenation, 2
- cyclohexane, 103, 104, 371, 372
- cyclohexyl-substituted quaterthiophene ( $CH_4$  T), 322
  - soluble, 322
- cyclopentadithiophene-benzothiadiazole copolymer (CDT-BTZ), 312, 313, 322, 345
- cysteine (Cys), 76, 211
- cytokeratin (CK), 294
- cytosines, 43, 259, 262
- Czochralski method, 325
  
- d**
- DAPI staining, 180
- DA polymer matrix, 405
- DBEDOT microrods, 394, 395
  - SEM images of, 394
- DB-TTF nanowire arrays, 320, 322
- decarboxylative polymerization, of acids, 13–16
- dedoping processes, 233, 242, 250
- dehalogenation, of chloro-substituted perylene, 3
- dehydrogenative polymerization, of *n*-dotriaccontane, 7
- dendrimers, 55, 56
  - amphiphilic, based on L-glutamic acid pH-responsive self-assembly, 57
  - heterostructures, as optical routers, 146
- density functional theory (DFT), 2
- deoxyribonucleic acid (DNA), 259
  - aggregates composed of different particle geometries and morphologies, 279–282
  - applications, 282–286
  - lamellar superstructures using nanoprisms, 282
  - nanoparticles of materials functionalized with DNA, 280
  - bifunctional template synthesized by treatment with restriction digest, 264
  - correlation of optical data with dynamic light scattering, 270
  - dialdehyde, 263
  - dialdehyde functions, 264
  - extended superstructures, 271–273
    - crystal structures, 272
    - hairpin DNA-mediated gold nanoparticle networks, 274
  - finite size DNA–AuNP assemblies, 273–279
    - asymmetric functionalization of nanoparticles with DNA utilizing silica particles, 275
    - DNA–gold nanoparticle clusters mediated using DTT, 278
    - TEM images of purified dimer, trimer, and tetramer structures generated using, 276
  - functionalization of gold nanoparticles and network formation, 267–271
  - immobilized on a spherical gold nanoparticle, 268
  - inherent biocompatibility, 261
  - intercalating molecules, 284, 285
  - intercalators, 102
  - as ligand, 267
  - mediated assembly of metal nanoparticles, methodologies, 261
  - multifunctional, 263
  - network formation using DNA-functionalized gold nanoparticles, 269
  - self-recognition of, 260
  - as a template material, 262–267
    - on geometrically tailored, 266, 268
    - on modified linear DNA strands, 262–265
    - on origami structures, 265–267
    - $T_m$  value, 269
    - triangle-shaped DNA origami decorated with AgNPs, 268
  - dephosphorylation, 112
  - dextran, 118
  - 3D growth, 170
  - 1D growth, of ADN, 141

- 1,2-diacyl-*sn*-glycero-3-phosphocholine-based nonaqueous VEGs, 371
- 4'6-diamidino-2-phenylindol (DAPI), 284, 285
- 1,5-diaminoanthraquinone (DAAQ), 139
- dibenzo[*d,d'*]thieno[3,2-*b*;4,5-*b'*]dithiophene (DBTDT), 343
- dibenzotetrathiafulvalene (DB-TTF), 319
- single-crystal field-effect transistors, 319
- 2,5-dibromo3,4-ethylenedioxythiphene (DBEDOT), 394
- dichloroanthracene (DBA), 326
- micro/nanowires, 326
- 6,13-dichloropentacene (DCP)
- single-crystal field-effect transistor, 344
- 4-(dicyanomethylene)-2-methyl-6-(*p*-dimethylaminostyryl)-4*H*-yan (DCM), 142
- 1,4-di(eicosyl)benzene, 6
- dielectric constant, 222
- Diels–Alder (DA) polymers, 404
- Diels–Alder reaction, 74
- 2-(*N,N*-diethylanilin-4-yl)-4,6-bis(3,5-dimethylpyrazol-1-yl)-1,3,5-triazine (DBPT), 135
- 1,4-diethynylbenzene, 11
- dimerization, 8
- aryl alkyne, 13
- dinitrophenol (DNP), 174
- diocetylbenzothienobenzothiophene (C8-BTBT) chlorobenzene solution, 327
- 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC), 163, 168, 170, 172, 174, 177, 371, 372
- frequency-dependent complex viscosity, 372
- dip coating, 318, 325
- schematic representations of, 318
  - solvent evaporation method, 318
- diphenylalanine peptide, 67
- analogues, 68
- 9,10-diphenylanthracene (DPA), 149
- 1,5-diphenyl-1,4-pentadien-3-one (DPPDO), 135–137
- 1,3-diphenyl-2-pyrroline (DP), 142
- meso*-diphenyl tetrathia[22]annulene[2,1,2,1] (DPTTA), 320
- dipole–dipole interaction, 141
- dip-pen nanolithography (DPN), 161, 162, 190, 238, 262
- of diffusive inks, 165, 166
  - of lipid inks, 166–170
  - of liquid inks, 165
  - scheme of, 162
- dipping processes parameters, 190
- 2,6-dipyrazol-1-ylpyridine, 135
- dithiol dithiothreitol (DTT), 268
- dithiophene-tetra-thiafulvalene (DT-TTF)
- nanocrystal, 318
  - single-crystal field-effect transistors, 319
  - solution-processed, 319
- divalent metal ions, 77
- diyne polycyclotrimerization, 11
- DNA. *See* deoxyribonucleic acid (DNA)
- DNA–AuNP. *See* DNA-gold nanoparticles
- DNA-gold nanoparticles
- adsorption of proteins to facilitate cellular uptake, 284
  - aggregates display fortunate combination, 282
  - architectures, 285
  - assembly on DNA template using origami structures, 267
  - effect of DNA binding molecules on the melting temperature, 285
  - exposure to degrading enzymes, 283
  - finite size assemblies, 273
  - functional antibody–DNA–AuNPs designed for, 283
  - hydrodynamic radius, 272
  - intercalating molecules, and affect on  $T_m$  value, 270
  - photothermal heating effect, 286
  - scanometric microRNA platform for detection of, 284
  - synthetically programmable crystallization, 271
  - TEM images of purified dimer, trimer, and tetramer structures, 276
- 1D nanostructures, 23
- DNP-cap-PE lipid, 179
- N*-dodecanoyl-(D-/L-)serine, 65
- dolomite, 374
- MgCO<sub>3</sub>, extraction process, 374
- doped conjugated nanofiber field-effect transistor, 330
- doped nanostructures, 149
- core/sheath structures, 153, 154
  - gradiently doped structures, 151–153
  - uniformly doped structures, 149–151
- doped polyaniline/polyethylene oxide (PEO) nanofiber, 329
- doping, 149, 233
- DPC method, schematic representations, 321
- 2D PEG-DA hydrogels, 189
- DPN. *See* dip-pen nanolithography (DPN)
- drag-reducing (DR) agents, 374
- drop-casted CH<sub>4</sub> T bottom-contact single-crystal transistors, 324

- drop casting, 318, 320
  - schematic representations of, 318
  - solvent evaporation method, 318
- drug delivery systems (DDS), 105
- drug encapsulation efficiency, 59
- dwell time, 171
- dynamic gels, advanced, 357
  - applications, 373, 374
  - classification, 357, 358
  - in nature, 358, 359
  - photoresponsive VEGs, 369–373
  - pH-responsive VEGs, 363, 364
  - redox-responsive VEGs, 362, 363
  - temperature-responsive VEGs, 364–369
  - theory, 375–379
  - VEGs, characterization, 359
  - – rheometer, 359, 360
  - – small-angle neutron scattering (SANS), 360, 361
  - – transmission electron microscopy, 361
- dynamic light scattering (DLS), 369
  
- e**
- e-beam lithography, 190
- EGaIn, self-healing conductor, 406
- elastic deformation, 171
- electrical conductivity, 233
- electrically conductive materials, 401
- electrochemical coupling, 101
- electrode of organic semiconductor nanocrystal field-effect transistor, 339–345
- electrolytes, 237
- electronic nanodevices, 75
- electronic properties, 1, 138, 145
- electronic skin. *See* E-skin
- electron microscopy, 271
- electroplating, 341
- electrospinning technique, 233, 246
  - carrier polymers utilized in, 247
  - of conducting polymer, 245–250
  - – structure, 247
  - diameter in range of, 246
  - doped conjugated nanofiber field-effect transistor fabricated by, 330
  - doped polyaniline/polyethylene oxide (PEO) nanofiber, 329
  - to fabricate polyaniline nanowires with diameters of, 249
  - polyaniline/polyethylene oxide (PEO) nanofiber, 329
  - schematic illustration of apparatus, 245
- electrospun conducting polymer nanofibers, 246
- electrostatic forces, 131
- electrostatic interaction, 220
- electrostatic repulsions, 76
- emission color, 142
- enamel, 79
- enantioselectivity, 62, 74
- endocytosis, 113
- energy balance, 170
- energy/charge transfer, 145
- energy storage, 401
- epithelial cell adhesion molecule (EpCAM), 294
- epithelium-specific antigens, 294
- EP–SPP coupling, 145
- erucyl bis(hydroxyethyl)methylammonium chloride (EHAC), 369
- E-skin, 401, 414, 415
- etched bottom-contact-type field-effect transistor, 333
- ethanol, 137, 178
- ethidium bromide, 284
- exciton polaritons (EPs), 132
- extracellular matrix (ECM), 109, 303
  
- f**
- fabricated rrP3HT nanofiber organic field-effect transistor, 339
- fabricating devices, on ultrashort organic crystals, 343
- fabrication, of uniformly doped structures, 150
- fac*-tris(2-phenylpyridine)iridium ( $\text{Ir}(\text{ppy})_3$ ) compound, 143
- Faradaic (redox) reaction, 362
- $\text{F}_{16}\text{CuPc}$  single-crystal nanoribbons, 347
  - optical OFET, diagram of, 348
- $\text{Fe}_3\text{O}_4$  nanoparticles, 297
- 11-ferrocenylundecyltrimethylammonium bromide (FTMA), 362, 363
  - electrochemical oxidation of, 363
  - electrolytic oxidation, 362
  - NaSal and oxidation state, 362
  - redox-responsive VEG, 363
- FETs. *See* field effect transistors (FETs)
- FIB technique, 345
- field effect transistors (FETs), 26, 233, 250, 323, 329
  - based on RRP3HT nanofiber, 331
  - nanoribbons-based, 347
    - schematic diagram, 329
  - flake-shell capsule, 98–100
    - formation, 98
    - storage and release processes of drug, 99
    - structural adjustments, 100

Flory's classification, 357  
 flow rate, 245, 299, 300, 310  
 – dynamic, 167, 168  
 – parameters applied for stable droplet formation, 202  
 fluorescein-labeled lipids, 177  
 fluorescence-based techniques, 179  
 fluorescence intensity, of selectively adsorbed proteins, 179  
 fluorescence micrographs, of T cells selectively, 180  
 fluorescent dyes, 61  
 focused ion beam (FIB), 344  
 – micromachining and microelectrode deposition technology, 344  
 Förster resonant energy transfer (FRET), 70, 141, 146, 149  
 Frenkel-type excitons, 132  
 F-T3-F solution, 330  
 functionalization, 54  
 – of cerasome surface, 97  
 – DNA, 260, 267, 274, 279, 282  
 – droplets without, 207  
 – nanotubes, 69  
 – with recombinant human selectin protein, 303  
 – sensor, 163  
 – surface, 119, 120  
 $\pi$ -functionalized system, 51  
 – molecular graphene, 53, 54  
 –  $\pi$ -conjugated gelators, 54  
 – porphyrin, 51–53

**g**  
 gadolinium-based nanoparticles, 119  
 gas sensing  
 – capabilities, of LbL films, 104  
 – selective, LbL film of graphene and ionic liquid for, 105  
 gas sensors, 233, 249  
 – organic field-effect, 349  
 gelation, 26, 27, 70  
 – instant, process of, 72  
 gelators, 41  
 – alkane- and fatty acid-based, 43  
 – amino acid- and peptide-based, 45–50  
 – carbohydrate-based, 50, 51  
 – cholesterol-based, 41–43  
 – nucleoside-based, 43–45  
 gel electrophoresis, 260  
 generalized indirect Fourier transformation (GIFT) technique, 378

GFP/pMHC-linked goldnanostructured droplets, fluorescence images, 211  
 Glaser coupling, 9–13  
 – of C20 and C22 molecules, 12, 13  
 – – after UV irradiation on Ag(111), 14  
 – of C38 molecule, 11  
 glass transition temperature, 411  
 glucocorticoid receptor (GR), 181  
 glycolipids, 63, 64  
 gold nanoparticles (GNPs), 31, 70, 120, 189, 190, 191, 192, 195, 206, 211, 267, 277, 281, 285  
 gold-nanostructured PEG-DA hydrogel beads, 199  
 gold–organic hybrids, 4  
 gold–organic linear polymers, 3  
 gold thin-film adhesion technique  
 – organic single-crystal field-effect transistor preparation, 342  
 gold wire  
 – electrode patterns, fabrication, 341  
 graphene, 104, 176  
 – layer-by-layer assembly, 104  
 graphene nanoribbons, 2  
 graphite oxide-coated Fe<sub>3</sub>O<sub>4</sub> MNPs, 300  
 growth processes  
 – dendritic organic–metal nanowire heterojunctions, 147  
 – of fluorescent perylene nanocrystals, 25  
 – nucleation and, 222  
 Guinier behavior, 361

**h**  
 $\beta$ -hairpin-like conformation, 69  
 halloysite nanotubes, 302  
 HBC nanocrystals, solution-processed assembly of, 337  
 HBC nanofibers, 337  
 heterochiral cyclic peptides, 69  
 heterogeneous conducting nanowires, 237  
 1,1,1,3,3-hexafluoro-2-propanol (HFIP), 67  
 hexahistidine (His6-tag) antibody-binding protein G, 189  
 hierarchical structures, 101  
 highest occupied molecular orbital (HOMO), 339  
 – level, 339  
 high-performance liquid chromatography (HPLC), 260  
 His-tag chelator, 178  
 HIV-1 transactivating transcriptor, 121  
 homogeneous nanotubes, 69  
 Hookean constant, 376

- hot wall epitaxial method, principle, 315  
 HTP single-crystalline nanowires, 338  
 human epidermal growth factor receptor (EGFR), 294  
 human mesenchymal stem cells (hMSCs), 306  
 human umbilical vein endothelial cells (HUVECs), 306  
 humidity, 137, 162, 166, 172  
 hydrogels, 76, 118, 189  
 – diivalent metal ions trigger, 76  
 – shrinkable, 77  
 hydrogen bonds, 22, 64, 101, 131, 135, 219, 370  
 – interactions, 141  
 hydrophilic drugs, 59  
 hydrophobic  
 – dipeptides, 67  
 – drugs, 59  
 – interactions, 64, 76  
 – nanostructures, 77  
 – surface effect, 144  
 hydroquinone, 265  
 hydroxycinnamic acid (HCA), 371  
 2-hydroxy-4'-(2-hydroxyethoxy)-2-methylpropiophenone, 191
- i*  
 IgE reactivity profile, on DNPGradient allergen arrays, 180  
 IgE receptor, 181  
 immune system, 187  
 immuno-cytochemical approaches, 293  
 immunological synapse (IS), 187  
 indirect Fourier transformation (IFT), 378  
 indium tin oxide (ITO), 295  
 ink transfer models, 164, 165  
 ink transport stages, in DPN, 169  
 inorganic materials, 21, 100, 101, 116, 131, 133, 350  
 inorganic nanomaterials, 21  
 inorganic nanoparticles, 77, 118, 119  
 integrated circuits, 250  
 $\pi$ – $\pi$  interactions, 131, 135, 141, 148, 151, 220  
 interdigitated transducer (IDT) electrodes, 174  
 intermolecular interactions, 131, 133  
 – inherent, 133–137  
 intralayer acid–anion interaction, 66  
 ion exchange, 388  
 – micro/nanostructure conversion, 388–390  
 – schematic representation, 389  
 ion exchange reactions, schematic representation, 389  
 ionic covalent bonds, 223  
 ionic liquids, 104  
 – layer-by-layer assembly, 104  
 ionic strength, 76  
 iridium(III) bis(2-phenylbenzothiozolato-*N*, *C*<sup>2</sup>) acetylacetone ((BT)<sub>2</sub>Ir(acac)), 149  
 iron oxide, 260  
*N*-isopropylacrylamide (NIPAAm), 306
- j*  
 Jell-O, 357  
 junctional proteins, 112
- k*  
 KCl crystals, 316, 317  
 kinetic crystal growth model, of anatase and rutile TiO<sub>2</sub>, 224  
 kinetic energy, 167
- l*  
 laminin, 79  
 Langmuir–Blodgett (LB) technique, 23, 27–29  
 lanthanides, 221  
 layer-by-layer (LbL) assemblies, 29–31, 95, 101  
 – of graphene and ionic liquids, 104  
 layer-by-layer (LbL) films  
 – applied to sensors based on electrical resistance, 105  
 – of graphene and ionic liquid, for selective gas sensing, 105  
 – of mesoporous silica capsule, for controlled release, 105–107  
 – QCM sensor system with, 102  
 LB film method, 328  
 lecithin, 371  
 leukocyte-inspired particles (LIPs), 298  
 L-glutamic acid, 56  
 Li batteries, 221  
 ligand exchange, 388  
 – micro/nanostructure conversion, 388–390  
 light beam, bending, 392, 393  
 light-emitting diodes (LEDs), 233, 347, 410  
 light–matter interactions, 132  
 lipid DPN (L-DPN), 162, 163  
 – applications in sensing, 172–176  
 – carrier ink, 163  
 – on graphene, 176  
 – nanobiological applications, 176–182  
 – scheme on goblet WGM structures, 175  
 lipid-encapsulated compounds, 182  
 lipidic nanoparticles, 117  
 lipids, 172  
 liposomes, 96, 117, 121  
 liquid crystalline oligothiophene derivatives, 321

liquid-phase-growth apparatus, 326

lithium, 221

lithography, 161

living polymers, 377

low-dimensional structures, 145

lowest unoccupied molecular orbital  
(LUMO), 340

## *m*

magnetic nanoparticles, 119

magnetic resonance imaging (MRI), 122, 123

mannose-6-phosphate receptor, 118

mast cells, 181

matrix metalloproteinases (MMP), 112

Maxwell equations, 377

Maxwellian relaxation time, 376

Maxwell model, of a viscoelastic fluid, 376

MBE. *See* molecular, beam epitaxy (MBE)

MDPB–FGEDR copolymer, 405

MEH-PPV self-assembly stripes, 331

melting temperature, 221

membrane proteins, 177

memory devices, 250

meniscus kinetics, 170

mercury lamp, UV irradiation, 394

merocyanine (MC), 372

– formation, 372

*meso*-diphenyl tetrathia[22]annulene[2,1,2,1]  
(DPTTA), 320

mesoporous carbon capsule, in layer-by-layer  
film, 103, 104

mesoporous carbon, in hierarchical  
assembly, 101–103

mesoporous silica capsules

– automodulated (periodic On and Off)  
materials release from, 106

– LBL film of, 106

messenger RNA detection, 260

metal-bis-metalloc Tridentate Schiff base  
(BMSB) building blocks, 388

metal coordination, 101

metal–insulator transition, 233

metal ions, 76, 223

– divalent, 77

metallic cells, 100, 101

– practical applications, improvements, 101

– preparation, 100

– with superior catalytic activities, 100

metal–ligand bonds, 61

metallocendrimers, 61

metal–organic polymers, 3

metal oxides, 221

metastasis, 293

methanol, 208

methoxycinnamic acid (MOCA), 371

9-methylanthracene (9MA)

– microneedles and microribbons, 392

– SEM images of, 393

methylcinnamic acid (MCA), 371

5-methyl salicylic acid, 369

micelles, 117, 118

microcontact printing ( $\mu$ CP), 163

microlaser sensing devices, 174

micro/nanostructure conversion

– charge transfer complex formation,  
385–388

– ion and ligand exchange, 388–390

– photoinduced reaction, 392–394

– reduction, 391

– thermal-induced reaction, 394, 395

microribbons, 392

molecular

– beam epitaxy (MBE), 217

– diffusion models, 170

– dynamics simulation, 76

– planarity, 144

– structure, of TMGE, 72

molecular design, and building blocks, 33

– amphiphiles, 33–41

– dendrimers, 55, 56

–  $\pi$ -functionalized system, 51–54

– gelators, 41–50

– typical building blocks for self-assembly, 34

Moore’s law, 95, 221

MTT assay, 59

multilayer stacking, control of, 163

multiorganic ribbon mask technique, 343

multiple drop casting method

– schematic illustration, 322

multiplexed lipid patterning, 177, 178

## *n*

nanobelts, 22

– assembled from a PA containing, 75

nanobiosensors, 177

nanocrystal device structures, schematic

– illustrations, 332

nanodots, 217

nano-FET devices, 347

nanofibers, 74–79, 303, 304

– based substrates, 303

– and field-effect transistors based on  
as-prepared fibers, 329

– preparation, schematic diagram, 329

nanofractals, 297, 298

nanogels, 117, 118

- nanomaterials. *See* inorganic materials; organic materials
- nanomic emulsions, 117, 118
- nanoparticles, 295
- exhibiting different material properties, 116
  - and imaging, 122–124
- nanopatterned APC surrogate systems, 188
- impact on cellular analysis, 188, 189
- nanopatterned hydrogels
- efficiently functionalized with anti-CD3 antibody, 194
- nanopatterned PEG-DA hydrogels
- biofunctionalization, 194, 195
  - characterization, 191–193
  - fabrication, 191–193
- nanophotonics, 131
- nanopores, 217, 304–306
- nanoposts/pillars-based substrates, 300–302
- nanoreactors, 61
- nanoribbons, 22, 137
- nanoscience, 21
- nanosensor, 249
- nanosheet, 29, 41, 52, 98, 99, 143
- triple-folded, 135
- nanostructured PEG-DA hydrogel beads, 198–200
- biofunctionalization, 204
  - characterization of, 203, 204
  - fabrication, by droplet-based microfluidics, 201–203
- nanostructured polymer surfaces, fabrication steps, 244
- nanostructured substrates
- for cells capturing, 306
  - for CTC Capturing, 294, 295
- nanostructures based on their dimensions, 23
- nanostructures, classification of, 22
- nanostructures, functions, 56
- nanofibers, 74–79
  - nanotubes, 62–74
  - vesicles/hollow spheres, 56–62
- nanostructures self-assembly method, for construction of, 23
- nanotechnology, 28, 217
- contribution, 95
  - supramolecular, 95
- nanotubes, 22, 62, 65, 137, 302
- functionalization of, 69–74
  - self-assembled lipid, 62–65
  - self-assembled peptide, 65–69
  - TEM and CLSM images, 72
- nanowires, 22, 135, 137, 236, 237
- arrays, 217
- -based substrates, 298, 299
  - exposed to gas vapors, 154
  - heterojunctions, 145, 146
  - p–n Junctions as photoelectric transducers, 146–149
- 2,6-naphthalenedicarboxylic acid (NDCA), 13
- NBD-conjugated phospholipids, 304
- NBD nanotubes, time-lapse fluorescence microscopic images, 71
- needle crystals, 320
- neural electrodes, 233
- nickel microparticles, 406
- Ni ions, 174
- nitrilotriacetic acid (NTA), 179
- chemistry, 189
- noncontact atomic force microscopy (NC-AFM), 1
- noncovalent interactions, 33
- non-liquid inks, 171
- normal human dermal fibroblasts (NHDFs), 306
- n-type material (5,10,15,20-tetra(4-pyridyl) porphyrin, H<sub>2</sub>TPyP), 147
- nucleation, 9, 24, 133, 222
- centers for the vertical epitaxial growth, 146
  - site-specific, 144
  - stage, 391
- nucleic acid-based methods, 293

## O

- occludins, 110, 112
- octadecyltrichlorosilane (OTS)-modified substrates, 320
- OFET. *See* organic field-effect transistor (OFET)
- ohmic conductance behavior, 265
- oligo-2,6-naphthalene, 14
- oligonucleotides, 260, 265
- oligopeptide-based bolaamphiphiles, 65
- one-dimensional (1D) nanostructures, 22
- optical imaging, 123, 124
- optical micrographs, of lipid patches, 176
- optical properties, 132
- of gradually doped 1D nanostructures, 152
- optical triode, 153
- optoelectronic devices, 233, 250
- optoelectronic properties, 1
- organic aggregates, 139
- organic charge-transfer (CT) salt, 385
- organic crystal nanostructures
- crystal lattice-induced epitaxial growth of, 317
- organic field-effect transistor (OFET)

- HTP single-crystalline nanowires, 338
  - from HTP single-crystalline nanowires, 338
  - overview of, 309
  - semiconductor nanostructures, fabrication
    - electrostatic spinning, 329, 330
    - physical vapor transport (PVT) growth, 328
    - solution process, 317–328
    - vapor-phase method, 310–317
    - temperature gradient, 310
    - thin film, 309
  - organic/inorganic hybrid micro/nanostructures
  - electronic properties and information storage, 396, 397
  - optical properties, 395, 396
- organic materials, 133, 139, 155, 395
  - organic–metal nanowire heterojunctions, 145
  - organic molecules, 22
    - assemble into, 133
    - spiraling cognition of relationships among, 156
  - organic nano-FETs
    - application of, 347–350
    - device structures, 332–335
    - preparation
      - nanocrystals, transfer of, 335–339
      - semiconductor nanocrystal field-effect transistor, electrode of, 339–345
      - shadow mask, 339, 340, 341
      - semiconducting materials, 311–313
    - organic nano field-effect transistor, 309, 332
      - device structures, 332
      - molecular structure, 346
      - preparation of, 335–339
    - organic nanomaterials, 22, 132, 155
    - organic nanoparticles, 115
      - exhibiting material properties, 116
    - organic nanoscale field-effect transistor
      - properties of, 345, 347
    - organic nano single crystals, 345
    - organic nanostructures, 139
    - organic nanowires-based inverter circuit, 349
    - organic ribbon mask, two-dimensional, 343
    - organic semiconducting materials, for nanodevices, 311–313
    - organic semiconductor nanoribbons
      - solution-processed, 324
    - organic semiconductors, 315, 322
      - in organic nano field-effect transistor, 346
      - properties, 330
  - organic semiconductor solution
    - supersaturation and precipitation, 323
  - organic–silver nanowire heterojunction, 144
  - organic single crystals
    - field-effect transistor, preparation, 342, 344
    - thermal irradiation, 341
  - organic system
    - TTET upconversion and FRET downconversion, 149
    - osmotic homeostasis, 73
    - OTS-treated silicon wafers, 337
    - *o*-xylene, 190

**p**

  - PAH–SPEEK complexes, 402
  - 1-palmitoyl-2-oleophosphatidylcholine (POPC), 371
  - PAMAM dendrimers, 55
  - PA nanofibers, 77
    - application, 77
    - to functionalize titanium implants, 79
    - TEM micrograph, 78
  - PANI–Ppy binary nanotubes, 236
  - paramagnetic inorganic nanoparticles, 119
  - paramagnetic ions, 120
  - passive diffusion, 110, 112
  - PBI–gold hybrid species, 5
  - Pb(SPh)<sub>2</sub> ribbons, 390
  - Pd(SPh)<sub>2</sub>
    - SEM images of, 390
    - UV-vis absorption and photoluminescence, 390
  - PEG-*b*-PCPTM polyprodrug amphiphiles, 58
  - PEG-DA hydrogels, 193
    - properties, 191
  - pentacene, 314
  - pentadecafluoroctanoyl chloride, 208
  - peptide amphiphiles, 65
  - peptide lipid-based gelators, 66
  - peptide-loaded major histocompatibility complexes (pMHC), 210
  - peptide nanotube arrays, 68
  - peptides, as building blocks, 75
  - perfluorooctanyl-triethylene glycol (PFO-PEG), 208
  - perylene (Pe), 391
  - perylene perchlorate reduction
    - Br<sup>–</sup> anions, 391
  - perylene, perylo[1,12-*b,c,d*]thiophene (PET), 315
    - chemical structure and crystal packing view, 316

- PFPE(7500)–PEG(350)–gold diblock copolymer surfactants, 207
- PFPE–PEG–PFPE triblock copolymer surfactant, 208
- phase transition initiation temperature, 223
- phenylazomethine dendrimers, 222, 223
- phosphate buffered saline (PBS), 192
- phospholipid lecithin, 372
- phospholipid membranes, 182
- phospholipids, 161, 177
- phosphorylation, 112
- photochromism, 149
- photodetectors, 233, 250
- photoelectrical transducers, 149
- photoexcitation, 222
- photoluminescence, 131, 144
  - aggregation-induced enhanced, 132
- photomechanical actuator
  - and mechanical properties, 397
- photonic devices, 145
- photonic properties
  - dendritic organic–metal nanowire heterojunctions, 147
- photoresponsive nonaqueous dynamic gels, 370
- phototransistors, 246, 323
- P3HT microwires, 1D single-crystal, 321
- P3HT nanofiber field-effect transistors, 329
- physical vapor deposition (PVD), 333
- physical vapor transport (PVT) growth, 310, 328
- physicochemical properties, 162
- planarity, 140
- plasma membrane
  - dynamics of GR at, 181
- plastic deformation, 171
- PLGA nanofibers, 304
- PMMA/SiO<sub>2</sub> substrate, 327
- polarized photoluminescence, 248
  - spectroscopy of single MEH-PPV nanofiber, 248
- polyamide condensation, 5
- polyaniline (PAN), 236, 249
- polyaniline/polyethylene oxide (PEO) nanofiber, 329
- poly(benzyl ether) dendritic organogelators, 57
- poly(benzyl ether) metallodendrimers, 61
- poly(oxyethylene) cholesteryl ether (ChEO<sub>15</sub>), 366
- polyelectrolyte (poly (diallyldimethylammonium chloride) (PDDA), 96
- polyelectrolyte multilayer (PEM), 403
- film, healing capability, 404
- poly(3,4-ethylenedioxy) thiophenes (PEDOT), 295, 296, 394
- polyethylene glycol (PEG), 58, 115, 267
- poly(ethylene glycol) (PEG)-based 2D and 3D APC surrogates, 188
- poly(ethylene glycol)-block-poly(propylene glycol)-block-poly(ethylene glycol) (P123), 386
- poly(ethylenimine) (bPEI)
  - layer-by-layer (LbL) assembled, 404
- poly( $\gamma$ -benzyl-L-glutamate)-*b*-hyaluronan vesicles, 59
- polyglycerol, 370
- poly(3-hexylthiophene) crystalline nanofiber device, 341
- poly(acrylic acid)–hyaluronic acid (PAA–HA) blend, 404
- poly(lactic-*co*-glycolic acid) (PLGA), 303
- poly-L-lysine, 303
- polymeric nanoparticles, 116, 117
- polymerization, 5, 189, 192, 394, 395
  - decarboxylative, 13
  - electrochemical, 238
  - metal-catalyzed, 13, 15
    - NDCA, 15
  - microemulsion, 234
  - on-surface, alkanes, 6
- polymer nanofiber, 329
- polymer pen lithography (PPL), 161, 163, 164
  - ink transfer in, 170–172
- poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene] (MEHPPV), 246
- poly(methyl methacrylate) (PMMA), 102
  - C8-BTBT, 328
  - optical images of films, 328
- poly(oxyethylene) alkyl ether, 368
- poly(oxyethylene) cholesteryl ether (ChEO<sub>20</sub>), 366
- poly(oxyethylene) phytosterol ether PhyEO<sub>20</sub>, 370
  - viscoelastic gels (VEGs), 366
- polypeptide-based vesicles, 59
- poly(*p*-phenylen-vinylen (PPV), 236
- polypyrrole nanowires synthesis, 236
- poly(sodium styrenesulfonate) (PSS), 104
- poly(styrene-*b*-dimethylsiloxane) diblock copolymer, 244
- polystyrene nanotube (PSNT) arrays, 303
- poly(urea-formaldehyde) core–shell
  - microcapsules, 406
- polyvinyl pyrrolidone, 303
- pore size, 5

porphyrins nanomaterials, 52  
potassium chloride (KCl), 369  
potassium cyanide (KCN), 280  
potassium ion channels, 70  
precipitation, 65, 323, 325  
proline, 61  
prostate-specific antigen (PSA), 294  
protein coupling strategies, 178  
PS-*b*-P2VP characteristics, 190  
P-selectin-coated microtubes, 303  
p-type doped materials, 249  
p-type material (copper phthalocyanine, CuPc), 147  
pulling method, oriented nanowires, 327

**q**

QCM sensor system, 102  
– LbL films of mesoporous carbon capsules, 104  
quartz crystal microbalance (QCM), 97  
quartz nanowires, 298, 299  
quenching, 176

**r**

reactive ion etching (RIE), 299  
recombinant proteins, 178  
reflective index, 297  
reflux time, 137  
regioselectivity, 7, 9, 16  
– of azide–alkyne cycloaddition, 9  
relative humidity (RH), 162, 172  
reprecipitation method, 24–26  
reverse transcription polymerase chain reaction (RT-PCR), 294  
rheological transitions, 373  
rheometers, schematic view, 360  
rhodamine-labeled lipids, 177  
rhodamine-tagged lipid, 182  
RRP3HT (poly(3-hexylthiophene)) nanofiber, 321  
RRP3HT nanofiber, field-effect transistor, 331  
rubrene doping, 142  
rutile flower-like TiO<sub>2</sub> nanospheres, 412

**s**

scanning electron microscopy (SEM), 99, 190  
scanning tunneling microscopy (STM), 1, 218  
seed-mediated growth, 335, 336  
selective adsorption, 178  
selectivity, tunable sensors, 103  
self-assembled lipid nanotubes (LNTs), 62  
self-assembled monolayer (SAM), 219  
self-assembly

– of polyprodrug amphiphiles, 59  
– in solution, 31, 32  
self-healing  
– conductive polymers, 403  
– – synthesis of, 403  
– conductor  
– – advantage of, 408  
– – EGaIn, 406  
– defined, 401  
– elastomers, 415  
– electrode, design and structure, 409  
– electronic nanodevices, 414  
– – defined, 401  
– – electrical conductors, 403–408  
– – electronic skin, 414, 415  
– – in energy storage devices, 408–414  
– – material, 401–403  
– – overview of, 401  
– electronic sensor skin, 414  
– organometallic polymer, 403  
– polymer, 407  
– SHP electrical and mechanical capability, 410  
– systems  
– – categories, 402  
semiconducting organic molecules, 77  
semiconductors, 223, 237, 321  
– nanoparticles, 119, 120  
– sensors, 75, 233, 350  
SEM images  
– Ag nanoparticles, 387  
– and CuPc nanostructures, 315  
– of perylene, 391  
– polyaniline nanofiber bridging gap between metal electrodes, 249  
– TCNQ microstructures, 386  
– TTF microparticles, 386  
– of vesicles, 60  
– Zn(SPh)<sub>2</sub>, 390  
semitransparent composite conductor, 405  
shadow mask, 339, 340, 341  
β-sheet conformation, 76  
SHP/CB composite coating, 410  
shrinking behavior, 98  
silicon microparticles (SiMPs), 408  
– cycling lifetime of, 408  
– self-healing silicon electrodes, 410  
silicon oxide, 176  
silicon wafers, 264  
siloxane bonds, 96  
silver conductive nanowires (AgNWs), 403  
– polyelectrolyte multilayer (PEM), 403  
silver ions, 263

- silver nanowires, 144, 405
  - DA polymer matrix, 405
- single-crystal nanostructures, 137
- single-crystal P3HT microwires
  - morphological features and structure characterization, 323
- single-walled carbon nanotube (SWCNT) films, 411
  - electrical conductivity, self-healing, 413
  - self-healing substrates, 413
- Si shadow mask, preparation, 342
- Si/SiO<sub>2</sub> substrate
  - PET single crystals, 315
- Si/SiO<sub>2</sub> substrate, 334
- site-selected assembly, on specific substrates, 138, 139
- Si wafer, 342
- size-dependent excitation, 233
- small-angle neutron scattering (SANS), 360
- small-angle X-ray scattering (SAXS), 271, 360
- small-molecule semiconductors, 330
- sodium deoxycholate (SDC), 372
- sodium 3-hydroxynaphthalene-2-carboxylate (SNHC), 369
- sodium 1-oxo-1-[4-(tri-decafluoroethyl phenyl]-2-hexanesulfonate (FC6-HC4), 369
- sodium salicylate (NaSal), 362
- soft cell-like structures, 96
- soft matter assembly
  - for atomically precise oxide layers, 220, 221
  - for constructing nanostructure with atomic precision, 219
- soft template synthesis, 234–236
- solar cells, 1
- “sol–gel” transition, 374
- solid electrolyte interphase (SEI), 408
- solid electrolyte interphase (SEI) growth, 408
- solubility, 24, 32, 41, 117, 138, 169, 317, 322, 371
- solution-based delivery, 182
- solution-based synthesis, 233
  - conducting polymer nanostructures, 234
  - hard template approach, 236, 237
  - soft template approach, 234–236
- solution-processed organic semiconductor nanoribbons
  - top-contact field-effect transistor, 324
- solvent effect, in assembly, 137
- solvent etching effect, 137
- solvent vapor annealing (SVA) method, 327
- sphere-like organometallic complex, 151
- spherical nucleic acids (SNA), 260
- spin casting processes parameters, 190
- spiropyran (SP), 370, 372
  - 1',3',3'-trimethyl-6-nitrospiro[1(2H)-benzopyran-2,2'-indoline], 372
- sputtering–annealing cycles, 6
- stability, 162
- “stamp” transport mode, 171
- static light scattering (SLS), 361
- stereocomplex formation, 101
- steric hindrance, 140, 151
- steroids, 63
- stilbene, 370
  - *cis-trans* conversion of, 392
- STM images
  - of AEB monomer deposition on Au(111), 8
  - of C22 dimers, 14
  - for polymerization of NDCA on Cu(111), 15
- streptavidin, 174, 178
- stress relaxation function, 378
- structural deformation, 144
- structure control, through intermolecular interactions, 140
- structures obtained
  - from synergistic assembly of different compounds, 141, 142
  - via molecular design, 140, 141
- structure modulation, through external factors, 143
- heterostructures through site-specific epitaxial growth, 144, 145
- structures *vs.* aging time, 143, 144
- substrate-based fabrication, 233
  - add to surface, 237
  - chemical polymerization, 240, 241
  - direct writing, 237, 238
  - electrochemical polymerization, 239
  - electrostatic assembly, 242
  - *in situ* synthesis or assembly, 238
  - conducting polymer nanostructures, 237
  - remove from surface, 242
  - etching, 243–245
  - nanoscratching, 242, 243
- substrate effect, on assembly of organic molecules in vapor phase, 138
- sumatriptan, 58
- supercapacitors, 250, 411–413
- superhydrophobic, 401
- supersaturation, 133
  - degree of the vaporized molecules, 138
- supported lipid bilayers (SLBs), 205
- supramolecular chemistry, 95
- supramolecular network
  - electrically and mechanically self-healing supercapacitor, 412

- surface acoustic wave (SAW) sensor, 174  
 surface energy, 135, 170  
 surface-enhanced Raman spectroscopy (SERS)  
   signals, 281  
 surface functionalization, of  
   nanoparticles, 120–122  
 surface tension, 138  
 surfactants, 369  
   – amphiphilic, 61  
   – synthesis, 200, 201, 207, 208
- t**
- tannic acid, 102  
 TAT-coupled polymeric micelles, 121  
 Taylor cone, 246  
 T cell–antigen-presenting cell (APC), 187  
 T cell–APC interface, 187  
 T-cells, 179, 180, 187, 189, 197, 199  
   – activation, 188  
   – differentiation, 187  
   – isolation, 195  
   – proliferation, 196  
   – receptors, 188  
   – stimulation, 195  
 TEM micrograph, cell entrapped in  
   nanofibrillar matrix, 78  
 temperature, 138  
   – programmed desorption (TPD), 2  
 template-free method  
   – for heterostructures with, 151  
 template inorganic mineralization, 77  
*tert*-leucine, 69  
 tetracene, 314  
 tetracyanoquinodimethane (TCNQ), 320, 385,  
   386, 387  
   – absorption of, 386  
   – conductive charge transfer salts, 407  
   – microstructures, 386  
   – SEM images, 387  
   – UV-vis spectra, 388  
   – UV-vis spectra of, 388  
 thermal diffusion, 222  
 thermal irradiation, 341  
 thermodynamics, 223  
 thiophene/phenylene co-oligomer  
   (BP2 T), 317  
   – chemical structure of, 317  
 three-dimensional (3D) nanostructures, 23  
 TiO<sub>2</sub> nanofibers, 304  
 TiO<sub>2</sub> nanostructures  
   – electrically and mechanically self-healing  
   supercapacitor, 412  
   – glass transition temperature, 411  
 tissue inhibitors of MMPs (TIMPs), 112  
 titanium *n*-butoxide, 303  
 titration curve, 58  
 Tollens reaction, 262, 264  
 toluene, 65  
 top-contact CuPc nano field-effect  
   transistor, 340  
 top-contact nano field-effect transistor  
   – fabrication procedure of, 341  
 top-contact nanostripe field-effect transistor  
   – schematic diagram of, 332  
 TPP/rubrene molar ratio, 142  
 transactivator of transcription (TAT), 121  
*trans*–*cis* photoisomerization, 370  
 transferrin (Tf), 121  
   – receptor, 122  
 transferrin receptors (TfRs), 297  
 transistors, 1, 250  
 transition temperature, 222  
 transmission electron microscope (TEM), 96,  
   341  
   – CuPc nanostructures, 315  
 triazoles, 9  
   – derivative, 262  
 1,4-triazoles, 7  
 triblock microrods, 142  
 triethylamine hydrochloride (Et<sub>3</sub>NHCl), 369  
 triethylene glycol, 208  
 tri(ethyleneglycol) mono-*n*-dodecyl ether  
   (C<sub>12</sub>EO<sub>3</sub>), 366  
 triisopropylsilyl ethynyl pentacene (TIPS-PEN), 325  
   –  $\pi$ – $\pi$  intermolecular interactions, 325  
 1',3',3'-trimethyl-6-nitrospiro[1(2H)-benzopyran-2,2'-indoline], 372  
 2,4,5-triphenylimidazole (TPI), 150  
 1,3,5-triphenyl-2-pyrazoline, 141  
 triplet–triplet energy transfer (TTET),  
   149  
 tris(8-hydroxyquinoline)aluminum  
   (Alq<sub>3</sub>), 138  
 TTF conductive charge transfer salts, 407  
 TTF derivative DT-TTF nanoscale single  
   crystal-based organic field-effect  
   transistor, 347  
 TTF materials, 326, 386  
   – micro/nanowires, 326  
 TTF-TCNQ (tetraphiafulvalene-tetracyanoquinodimethane), 406  
   – nanowires, 386, 387, 396  
   – *I*–*V* curves, 396, 397  
   – *I*–*V* curves for a network of, 396  
 tubular structures, 137

- two-component drug system, 76  
 two-dimensional (2D) nanostructures, 23
- u**  
 UCLA logos, 405  
 Ullmann Coupling, 2–5  
 ultrahigh vacuum (UHV) conditions, 1, 2  
 ultraviolet irradiation, 203  
 UV irradiation, 150, 370  
 UV-triggered self-healing polymer (SHP), 402
- v**  
 van der Waals forces, 9, 11, 131, 135, 151, 168, 342  
   – interactions, 22, 322, 396  
 VEGs. *See* viscoelastic gels (VEGs)  
 vesicle-encapsulated microtubes, 66  
 vesicles/hollow spheres, 56–62  
 viscoelastic fluid, Maxwell model, 376  
 viscoelastic gels (VEGs), 358  
   – anionic surfactants, 369  
   – C<sub>14</sub>EO<sub>3</sub> and Tween-80, 366  
   – characterization, 359  
   – light-responsive surfactants, 369  
   – number of publications, 359  
   – photoresponsive, 369–373  
   – pH-responsive, 364  
   – PhyEO<sub>20</sub>/H<sub>2</sub>O, 371  
   – poly(oxyethylene) alkyl ether and C<sub>12</sub>EO<sub>3</sub>, 368  
   – poly(oxyethylene) cholesterol, 366  
   – potassium chloride (KCl), 369  
   – properties of, 358  
   – redox-responsive, 362, 363  
   – rheological properties, 361  
   – rheology, 359, 360  
   – rheometer, 359, 360  
   – small-angle neutron scattering (SANS), 360, 361  
   – temperature-responsive, 364–369
- transmission electron microscopy, 361  
 viscoelastic gels, rheological behavior, 377  
 viscoelasticity, 371  
 viscoelastic micelles, 377  
 viscosity, 174, 246, 368, 370
- w**  
 water-in-oil emulsion, 205  
   – biofunctionalization of nanostructured droplets, 209–211  
   – cell experiments, 211–213  
   – characterization of the gold nanostructured droplets of, 209  
   – droplet-based microfluidics, 208  
   – nanostructured and specifically biofunctionalized droplets, properties, 205–207  
   – surfactant synthesis, 207, 208  
 wetting properties, 162  
 WGM-based sensors, 174  
 worm-like micelles, 376  
 write-read-erase-read (WRER) cycles, 387, 397
- x**  
 X-ray photoelectron spectroscopy (XPS), 2  
*m*-xylene, 320
- y**  
 Young's modulus, 67, 188, 193, 296
- z**  
 zero-dimensional (0D) organic nanoparticles, 22  
 Zn–BMSB–Zn particles, 388, 389, 396  
 Zn(II) interconnecting nodes, 388  
 Zn<sup>2+</sup> ions, 390  
 ZnO nanorods, 305  
 Zn(SPh)<sub>2</sub> networks, 389  
 zonula occludens (ZO), 112