Index

A
abacavir, 137, 146
acetone, 296–306, 308
acrylamide, 65, 141, 143, 153
active site, 43, 44, 51, 151, 152, 375
additives, 13, 39, 118, 274, 318, 384, 394, 396, 400
addressing of electrochemical synthesis
  robotic, 318–320, 334–341, 346, 347
  electrical or microfluidic, 318–320
adenosine-triphosphate (ATP), 249, 251–263, 434–436
affinity, 4, 9, 28, 34, 42, 47, 49, 51, 52, 72, 74, 135–138, 143–147, 150, 155, 174, 180, 188, 195, 206, 210, 212, 215, 217, 218, 223–226, 230–233, 236, 239–241, 250–253, 260–266, 383
AFM (atomic force microscopy), 68, 69, 71, 106–110, 203, 206, 207
alkanethiol, 64, 70–74
ametryn, 138, 185, 186, 383
aniline, 326, 353
aniline derivatives, 209, 325, 326, 351–354
anions, 30, 81, 85, 91–99, 110, 381, 382, 388, 420, 433
antibodies, 9, 27–31, 34–38, 47–52, 98, 139, 143–145, 201–208, 212, 216–218, 223, 244, 262, 266
  construction of library, 228–230
  monoclonal, 47, 143, 145, 212, 217, 239, 241, 243
  polyclonal, 47, 143, 145, 237
  single-chain, 223–244
aptamer, 4, 5, 9, 26, 29, 52, 251, 265
arylthiophenes, 347–349
atrazine, 148, 185, 186, 207, 208, 210, 211, 207–212, 383
atropine, 138

B
benzimidazolium dyes, 378, 432–436
binding constant, 9, 12, 13, 203, 205, 212, 214, 316, 321, 324, 326, 436
binding energy, 138, 139, 142, 143, 154, 160, 203, 280, 289, 290, 474, 475
biotin, 137, 138, 145–147
BSA, 243
bupivacaine, 191–193

C
Ca^{2+}, 92–110, 381, 421, 441, 442
caffeine, 137, 147, 150, 152
calibration, 27, 69, 204, 206, 215, 217, 357–364, 380, 381, 459, 477, 486
canonical mixture, 463
carbamate, 137, 146, 153
carboxytetramethylrhodamine, 88, 89, 96
catalytic metal, 12, 13, 32, 484
cations, 92, 93, 95–110, 379–381, 419, 421, 424, 441
Cd^{2+}, 379–381
CD4, 243
CdSe, 50, 117–130
CHEMFET, 94
chemical sensing, mechanism, 29, 38–41, 117, 143, 150, 190, 274, 295, 297, 379, 442, 476
chemical sensor, definition, 26
chemical vapor deposition, 8–11
chemometrics, 485, 32, 138, 139, 158–160, 190
click chemistry, 425, 426, 446, 447
cluster analysis, 126, 129, 473, 486
Co^{2+}, 92–110
cocaine, 137, 145, 146
collective effects, 9

combinatorial chemistry, 5, 6, 296, 331–335, 356, 364–366, 373–388, 422–424
combinatorial electrochemistry, 317–327, 331–367
combinatorial library
  design, 225, 242, 321–324, 360, 387, 486
  discrete, 9–10, 12, 275, 321, 386
  electrochemical characterization, 317, 318, 323, 347–350
  gradient, 9–12, 69–74
  multiparameter screening, 324–326
  virtual, 137–139, 140–145, 177, 384
combinatorial materials science, 4–7, 296, 297, 483–485
competetive binding, 181, 183, 186, 214, 215, 377, 378
complexation, 9, 84, 86, 103, 142, 185, 252, 474, 477
composite, 306, 476
conductive polymers, 10, 315–327
conductive polymers, combinatorial synthesis, 318–323, 327
conductive polymers, variable parameters, 317–318
confocal microscopy, 101, 109, 110, 379
copolymer, 10, 12, 41, 65, 119, 315, 317, 322, 324, 326, 333, 375, 386, 394, 396, 400, 401, 455–468
copolymers of polyaniline, 326
copper, 379, 380
$CoTiO_3$/La, 285–288
coumarin dyes, 95–, 98, 254, 265, 424–426, 444–450
creatinine, 137, 143
cross-linking, 14, 33, 41–44, 138, 140, 153, 156, 158, 174–179, 184, 188–191, 212, 375, 382., 383
Cu^{2+}, 92–110, 379–381
Cy5, 240, 254–257, 260, 261

D

dapoxyl dyes, 424–429
data analysis, data mining, 4–7, 125, 126, 158, 274, 280, 321–324, 473, 477, 483, 486
data management, 7, 321, 332, 335, 343, 485, 486
database, 7, 140, 226, 279, 280, 321
DCM dye, 407, 408
deoxyephedrine, 137, 145
deposition, 8–13, 29, 39, 40, 63–68, 81, 85, 106, 108–110, 281–283, 286, 290, 295–301, 306–308, 317, 323, 327, 335, 359–361, 455, 456, 468
descriptor, 7, 8, 128, 159, 472, 475, 476, 485, 486,
design of experiments, 6, 7, 158, 160, 321
diagnostics, 42, 48, 53, 81, 223, 249, 273, 486
dibenzothiaphene, 137
dibenzylcarbamate, 137, 153
diethylaminoethylmethacrylate (DEAEMA), 177, 178, 186–190
dip coating, 10, 40
dip pen nanolithography (DPN), 85, 105–110
dissociation constant, 9, 12, 211, 225, 252, 262–265
diuron, 148, 207–212
divinylbenzene (DVB), 141, 178, 179, 188, 189, 375
DNA (deoxyribonucleic acid), 5, 26–29, 34, 35, 38, 49–52, 66, 83, 136, 223–228, 230, 238, 251, 320, 335, 419, 422, 429–431, 438
dopamine, 84, 155, 263–265
dopant, 9, 10, 13, 274, 280, 287–289, 317, 400, 407
doping, 5, 13, 32, 280, 282, 284, 287, 289, 297, 400
dyes, 4, 5, 12, 33, 37, 41, 50, 83, 117–119, 130, 209, 214, 216, 251, 323, 335, 378, 379, 386, 419–436, 441, 444
dynamic range, 84, 335

E

EHS (environmental health and safety), 8
electrode, 10, 13, 26, 28–35, 39–41, 48–52, 74, 94, 205, 206, 273, 275–281, 287., 290, 300, 307, 308, 316, 317–322, 325, 332–367, 458, 461
electrode array, 10, 275, 277, 278, 287, 290, 321–323, 333, 335, 338, 339, 356
electronic tongue, electronic nose, 26, 27, 32, 274, 472, 476, 478
electropolymerization, 10, 40, 41, 51, 316–319, 322, 323, 327, 333
ELISA (enzyme-linked immuno-sorbent assay), 143, 161, 208, 212, 216, 224, 232, 233, 235, 238, 239, 241
end-use environment, 5, 8, 29
enrofloxacin, 5
enzyme, 4, 5, 9, 26–38, 40, 42–53, 136, 139, 143, 161, 186, 195, 224, 229, 230, 241, 316, 322, 327, 361, 388, 394, 419, 441, 450
epinephrine, 263–265
estradiol, 188–190

ethanol, 46, 152, 280, 283, 288, 289, 296–306, 308
ethyleneglycoldimethacrylate (EDMA), 153, 174, 178, 179, 184, 186–192, 194, 209

F
factorial experiment, 6, 158, 191, 192
field-effect devices, 12, 31–33, 39, 40, 46, 49, 94, 484
fluorescence, 10, 11, 36–38, 41, 48–52, 64–67, 70, 74, 81–111, 137, 138, 144, 150, 157, 183, 188, 190, 203, 208, 209, 213–217, 233, 236, 240, 243, 249–260, 332–335, 347, 375–381, 386, 400–412, 419–438, 441–450
  quenching, 37, 38, 83, 84, 92–94, 97–98, 101, 105–109, 157, 255, 381, 386, 400, 409–412, 433
fluorescent
  monolayers, 84–110
  probe, 41, 65, 82, 85, 86, 99, 262, 407
fructose, 377, 378
FTIR (Fourier transform infrared spectroscopy), 35, 71, 72, 376

G
gas sensing, 5, 12, 26, 27, 32, 37, 39, 117, 118, 273–274, 283, 286, 290, 295–308, 321–327, 456
Gibbs free energy, 142, 161
glucose oxidase, 323, 327, 388
glutathione, 419, 436–438
gold, Au, 38, 52, 64, 70–74, 82, 83, 204, 206, 207, 287, 335, 338, 461, 462,
gradient
  molecular (surface concentration), 63–75
  nanoparticle size, 11
  PEG (polyethylene glycol), 68, 72
  temperature, 10, 11
  thickness, 10, 11, 72, 73, 325
green fluorescent protein (GFP), 233, 237, 238, 243
guanidine triphosphate (GTP), 252–254, 258–261, 378, 379, 419, 432–438

H
HCl-gas, 315, 325–326
Hg^{2+}, 95, 97–110, 379, 380, 424
high-throughput
  characterization, 6, 7, 9, 274, 321, 322, 485
  experimentation (HTE) and screening (HTS), 6–9, 63, 98, 117–119, 130, 241, 274, 275, 327, 332–340, 347, 363, 387, 424, 425, 458, 462, 465, 466, 473, 477, 478, 485
histamine, 263–265
histidine, 137, 265
HPLC (high performance liquid chromatography), 27, 146, 159, 162, 182–185, 188, 189, 264, 350, 374, 375, 376, 382–382, 446,
hydrophilicity, 14, 43–45, 69, 73, 88, 191–194, 364, 384, 387, 394, 396
hydrophobicity, 5, 65, 67–69, 74, 88, 90, 191, 202, 210, 215, 264, 364, 384
hydroxyethylmethacrylate (HEM, HEMA), 141, 145–147, 153, 162, 177, 178, 185–194

I
immobilization of receptors, 9, 33, 34, 41–44, 46, 48, 66, 83, 84, 103, 106, 316,
immobilized enzymes, 5, 36, 51, 322–333,
immunostaining, 238–240
impedance spectroscopy, 32, 34–35, 273–274, 277–285, 297
indicator, 4, 12–13, 28, 37–38, 41, 50, 83, 189, 386
initiator of polymerization, 68–69, 158, 175, 179, 183, 396
ionophores, 4, 9, 31, 37, 40, 84–85
ion-selective electrode, 26, 28, 30, 39, 94, 327
itaconic acid (ITA), 141, 177, 178

L
liquid dispensing, 10
lissamine, 88, 89, 91–94, 100, 104
lithography, 67–69, 71, 85, 86, 105, 106, 109, 323, 327
long - term stability, 3–4, 8–9, 12, 82–83, 129, 275, 295, 349, 358, 360

M
Mahalanobis distance, 126, 129
metal oxide, 274, 289, 475, 484, 485,
methacrylamide (MAAM), 177, 178, 189, 190
methacrylic acid (MAA), 174, 177, 178, 189
methadone, 137, 145, 146
methylenediacrylamide (MDA), 179
Mg^{2+}, 381, 382
microcontact printing, 70, 73, 85, 105–107, 109

microcystin, 137, 143–145
microextrusion, 10, 11
microfluidic, 29, 32, 53, 75, 81, 84, 98, 103, 105, 109, 110, 318, 319, 335, 455, 456
microstructure, 5, 11, 278, 301, 361
microtiter plates (well plates, MTP), 29, 81, 98–103, 110, 180–188, 255, 320, 332, 335, 337–344, 348–367, 375, 386, 387, 405, 458–463
modeling, 5, 7, 135, 136, 139–164, 175, 177, 190, 386, 463, 464, 473–476, 485, 486
molecularly imprinted polymers
  computational design, 135–172
  monomer template ratio, 143–148
  three-dimensional imprinting polymerization136
  two-dimensional imprinting polymerization, 136
  molecular dynamics, 148–153
  molecular modelling, 144–147
morphine, 137, 145, 146
morphology, 5, 8, 9, 13, 46, 174–176, 180, 181, 281, 301, 394
multiparameter analysis, 324–326

N
N-[3–(trimethoxysilyl)propyl]ethylenediamine (TREDA), 87–91, 95, 99
nanomaterial, 4, 9, 118
nanoparticle, nanocrystal, 4, 5, 11–13, 50, 72, 106, 117, 118–130, 174, 280, 296, 301, 316, 335, 426
neural networks, 82, 138, 139, 158, 159, 296, 387, 409, 473, 478
N-Hydroxysuccinimide (NHS), 72–74, 204, 254
Ni^{2+}, 359, 360, 379
nicotinamide, 138
nifedipine, 186, 187
nilvadipine, 138, 156
NO, 282, 283, 288–290, 356–358, 362, 363
NO_2, 280, 283, 288, 289, 290, 295, 296, 302, 303, 308
normal distribution, 464
normal probability, 464
nucleic acid, 5, 26–29, 34, 35, 38, 42, 49–52, 62, 83, 98, 136, 223–228, 230, 238, 250, 251, 265, 320, 335, 419, 422, 429–431, 438

O
oligoethylenglycol (OEG), 70, 375
ORMOSIL, 383, 386, 387, 397, 398, 402, 411

P
palladium, Pd, 31, 39, 70, 280, 282, 287, 335, 444–447, 450
paracetamol, 137
parallel analysis, 6, 12, 98, 109, 182–185, 189, 273, 274, 290, 333, 339, 342, 343, 364, 458, 468
parallel synthesis, 4, 6, 7, 81, 84, 85, 98, 103–105, 110, 184, 273, 278, 318, 319, 335, 338, 356, 374–377, 380, 384, 424, 446, 456
paramagnetic, 3, 27
passivation, 119
Pb^{2+}, 92, 93, 99–110, 379–381
PCR (polymerase chain reaction), 225–230
pentaerythritoltrimethacrylate (PETRA), 179
peptide
  receptors, 201–218
  dioxin-binding, 212–218
  herbicide-binding, 207–212
  porphyrine-binding, 202–207
phase angle, 286, 461
phenylboronic acid, 315, 377, 378
phenylbutyric acid, 383
phosphotyrosine, 262–265
photoactivation, 118–123
photobleaching, 117, 118, 431
photoluminescence, 117–129
photopolymerization, 10, 11
photostability, 118, 431, 436
plasmonic nanostructure, 12, 13
poly(dimethyl-aminoethyl)methacrylate, 119
poly(isobutylene), 119
poly(methyl-methacrylate) (PMMA), 69, 119–126, 129, 130
poly(trimethyl-silyl)propyne, 119
polyaniline, 315–327
polycapro-lactone, 119
polycarbonate, 10, 119, 455–468
polydimethylsiloxane (PDMS), 68, 71–73, 86, 107, 108
polyethylene glycol (PEG), 68, 72–74, 215, 375, 400
polyimide, 119
polymer
  biodegradable, 393–396, 401, 403
  composition, 137, 140, 175–179, 394, 459, 463, 464
  conjugated, 4, 5, 12, 13, 316–323, 326
  molecularly imprinted, 4, 12, 14, 34, 41, 42, 51, 52, 64, 135–162, 173–195
  thickness, 318, 325
polypyrrole, 315–318, 323
polyvinyl-pyrrolidone, 119

porogen, 14, 138, 153, 155–158, 174, 175, 180, 183, 184, 187–189, 191–195, 383
porosity, 13, 317, 397
porphyrin, 40, 51, 202–207, 356–358
predictive model, 485
principal components analysis, 120, 125–129, 473
PRODAN dye, 407–408
property/composition mapping, 463, 465
protein (micro)array, 236, 241, 242, 320
Prussian blue, 322–323, 327
pulsed-laser deposition, 10, 297
pyrene, 252, 407–408

Q
quality control, 230, 346, 350, 357
quantitative prediction of properties, 137, 138, 148, 149, 152, 159, 185, 250, 386, 474, 486
quantum mechanics based methods, 138, 140, 154–157, 160, 472–474

R
rational design, 4, 5, 63, 82, 128, 135, 137, 139, 143, 202, 264, 382, 384, 444
recognition event, 29, 38, 51, 82, 142, 419, 420, 422
response pattern, 94, 98, 102, 117, 118, 123–126, 129, 130
rhodamine B, 88–92, 97–110
ribonucleopeptide (RNP), 249–266
RNA (ribonucleic acid), 224–225, 249–266, 335, 419, 422, 431, 438
RNP library, 249, 254–258, 266
rosamine dyes, 424, 425, 436–438
Ru-complexes, 83, 280, 282, 337, 339, 349, 350, 366, 402, 411, 412,

S
scanning electrochemical microscopy (SECM), 346, 360–363
screen printing, 10, 26, 30, 31, 33, 275
screening of amperometric biosensors, 322, 323, 359
screening of virtual library, 141, 142
screening, impedometric, 273–290
selectivity, 3–5, 8, 9, 13, 29, 32, 33, 39–47, 52, 63, 64, 84, 85, 93, 117, 135–138, 143, 147–155, 173, 174, 181, 183, 187, 188, 191, 195, 202, 251, 252, 259, 262–265, 280, 297, 300, 303, 304, 316, 333, 347, 355, 377, 431, 435, 436, 475, 476, 484
self-assembled monolayer (SAM), 40, 41, 63–74, 81–111, 206, 207
self-assembly, 10, 70, 174, 176
semiconductor nanocrystal, 4, 12, 117–119, 128
sensing material, aging, 12, 397
sensing material, bank, 7, 327
sensing of
  abacavir, 137, 146
  acetone, 296–306, 308
  adenosine-triphosphate (ATP), 249, 251–263, 434–436
  ametryn, 138, 185, 186, 383
  anions, 30, 81, 85, 91–99, 110, 381, 382, 388, 420, 433
  biotin, 137, 138, 145–147
  BSA, 243
  bupivacaine, 191–193
  Ca^{2+}, 92, 93, 95, 97–110, 381, 421, 441, 442
  caffeine, 137, 147, 150, 152
  carbamate, 137, 146, 153
  cations, 92, 93, 95–110, 379–381, 419, 421, 424, 441
  Cd^{2+}, 379–381
  CD4, 243
  Co^{2+}, 92–110
  cocaine, 137, 145, 146
  creatinine, 137, 143
  Cu^{2+}, 92–110, 379–381
  deoxyephedrine, 137, 145
  dibenzylcarbamate, 137, 153
  dopamine, 84, 155, 263–265
  enrofloxacin, 5
  epinephrine, 263–265
  estradiol, 188–190
  ethanol, 46, 152, 280, 283, 288, 289, 296–306, 308
  fructose, 377, 378
  glutathione, 419, 436–438
  GTP, 252–254, 258–261, 378, 379, 419, 432–438
  HCl-gas, 315, 325–326
  Hg^{2+}, 95, 97–110, 379, 380, 424
  histamine, 263–265
  histidine, 137, 265
  methadone, 137, 145, 146
  Mg^{2+}, 381, 382
  microcystin, 137, 143–145
  morphine, 137, 145, 146
  Ni^{2+}, 359, 360, 379
  nicotinamide, 138
  nifedipine, 186, 187
  nilvadipine, 138, 156

sensing of (*cont.*)
NO, 282, 283, 288–290, 356–358, 362, 363
NO_2, 280, 283, 288, 289, 290, 295, 296, 302, 303, 308
paracetamol, 137
Pb^{2+}, 92, 93, 99–110, 379–381
phenylbutyric acid, 383
phosphotyrosine, 262–265
serotonin, 263–265
sildenafil (Viagra), 193, 194
sulfonamide, 138, 158, 333
terbutylazine, 138, 185
theophylline, 137, 138, 147, 149–155, 164, 316
triazine, 137, 146, 147, 185, 186, 195, 207, 383
tryptophan, 265
tryptophan methyl ester, 137, 150
tylosin, 137, 146
Zn^{2+}, 99–110, 305, 421
serial analysis, 183, 185
serotonin, 263–265
signal transduction, 30–38
silane compounds, 43, 63–70, 83, 86, 95, 383, 384, 387, 397–401, 407, 409
sildenafil (Viagra), 193, 194
silver, Ag, 38, 70, 308, 349
slurry dispensing, 10
SnO_2, 296
sol-gel, 82, 373, 383–388, 397–399, 402
solid phase extraction, SPE, 136, 184
solvent casting, 10
solvent resistance, 455–466
spin coating, 10, 35
streptavidin, 233–243, 337
structure-property relationship, 126, 158, 274, 289, 455–457, 463–, 466, 472, 475–477, 486
studentized residuals, 464
styrene-butadiene, 119
styryl dyes, 407, 424, 425, 429–432, 441
sulfonamide, 138, 158, 333

T
template, 14, 41, 52, 136–143, 174–177, 228, 230, 383–385
terbutylazine, 138, 185
tetramethylrhodamineisothiocyanite (TRITC), 88, 89, 92, 94, 96, 100, 104
theophylline, 137, 138, 147, 149–155, 164, 316
thick films, 281–283
thickness shear mode sensor, 457
thioacetal, 144
toxicity, 13, 47, 217, 218, 340, 342, 431
transducer
mass-sensitive, 35–36
electrochemical, 30–35
optical, 36–38
thermal, 36
conductometric, impedometric, 12, 32, 41, 273–290, 326, 484, 485
triazine, 137, 146, 147, 185, 186, 195, 207, 383
trifluoromethylacrylic acid (TFM, TFMAA), 146–148, 154, 164, 177, 178, 185–190
trimethacrylate (TRIM), 178, 179
tri-n-octylphosphine oxide (TOPO), 118, 124,
tryptophan, 265
tryptophan methyl ester, 137, 150
tylosin, 137, 146

U
UV-ozonolysis (UVO), 68, 69

V
van der Waals interactions, 42, 43, 93, 142, 148, 150, 153, 164, 177, 471
variability, 460, 461
vinylpyridine (VPy), 177, 178, 185, 189
vinylpyrrolidone (NVP), 177, 178, 185, 188, 189

W
well plates – see microtiter plates
WO_3, 296

X
xanthene dyes, 436, 442, 443, 450,
xerogel, 386, 387, 397–402, 407, 409, 410, 412, 413
XPS (X-ray photoelectron spectroscopy), 71, 74, 88, 91

Z
Zn^{2+}, 99–110, 305, 421
ZnO, 273, 295, 296, 299–301, 305–308