

Index

A

- AC voltage 122, 377
- accumulation layer 590
- acetonitrile 902
- acetylcholinesterase 956
- acid corrosion 749
- acid stratification 817
- activation barrier 93, 623
- activation energy 91, 328, 623
- active material 790
- activity 39, 138
 - mean 137
- activity coefficient 39, 67, 140
 - in highly concentrated solution 142
 - mean 137
- adatom 536
- addition
 - radical 906
- additive 791, 819, 832
 - conductive 790
- adenosine diphosphate (ADP) 928
- adenosine triphosphate (ATP) 928
 - synthesis 932, 935
- adhesion promoter 449
- adiponitrile
 - synthesis 908
- admittance 386
- ADP. *see* adenosine diphosphate (ADP)
- adsorbate–adsorbate-interaction 724
- adsorption 304, 345, 651, 719, 948
 - competing 559
 - layer-by-layer 949
 - non-specific 948, 961
 - superstructure 452
- adsorption enthalpy 101
- adsorption isotherm 467
- adsorption site
 - single crystal electrode 445
- alkaline electrolysis (AEL) 881
- alkaline fuel cell (AFC), 875
- alkaline phosphatase 960
- alloy 776
 - steel 773
- alloy corrosion 750
- alternating current voltammetry 238
- alternating voltage *see* AC voltage
- amalgam process 899
- amount
 - of substance 17
- amount concentration 39
- amperometric sensor
 - Clark electrode 248
- amperometry
 - connection to HPLC 246
 - end point detection 246
 - pulsed amperometric detection 246
- amplifier
 - adder 284
 - inverter and scaler 283
- analog–digital converter 281
- analysis
 - qualitative 304
 - quantitative 304, 342
- analyte 189, 227, 307, 946
 - concentration 351
- angular frequency 380
- anion
 - activating 782
 - passivating 783
- anode 14
 - dimensionally stable (DSA) 898, 899
 - sacrificial 551, 758, 896
- anode-supported cell (ASC) 868, 872
- anodic oxide film 716
- anodic protection 759
- anodization 538, 776
- anodizing 759
- anodizing film 776
- anolyte 21
- Anson plot 344

1004 | *Index*

antibody 958
 monoclonal 958, 959
 polyclonal 958
apoenzyme 939
approximation
 steady-state 317
aptamer 962, 964
area
 electrochemically active (ECSA) 667, 861
aryldiazonium salt 697
aspect ratio 559
assay 947
 DNA 962
 homogeneous 964
 sandwich 963
asymmetry potential 196
atom probe tomography (APT) 773
atomic force microscopy 485
atomic layer epitaxy
 electrochemical 539
atomic orbital 572
ATP. *see* adenosine triphosphate (ATP)
ATR cell 368
Auger electron spectroscopy 418
 designation of lines 423
autoprotolysis 617
auxiliary electrode 208, 210
avidin 948

B

3,6-bis(dimethylamino)durene 331
background current 226, 347, 351
background voltammogram 308
band 572
band edge, upper/lower 572
band gap 572, 578, 603
band structure 665
 d-band center 665
band structure plot 578
Barker square wave voltammetry 232
battery 69, 507, 789, 790
 aging 800, 815
 classification 801
 connection parameter 810
 current density distribution 811
 cycle life 800
 discharge curve 795
 figure of merit 799
 form factor 810
 lead-acid 798, 815
 life time 799
 lithium-air 838

 lithium-ion 640
 metal-air 791, 837
 passive material 790
 primary 69, 805
 rate capability 804
 rechargeable 805
 redox flow (RFB) 791, 839
 safety 800, 832
 secondary 69, 805, 814
 service life 800
 shelf life 799
 SLI (starter-lighter-ignition) 814
 specification 792
 starter (SLI) 814
 state of charge (SoC) 798
 state of health (SoH) 800
 system 810
 vanadium redox flow (VRFB) 839
 zinc-manganese 812
bilayer
 tethered 706
binder 790
bioaffinity sensor 948, 958, 962
 DNA 962
bioanalytics 946
biochips 947
bioelectrochemistry 927
biofilm 770, 957
biofuel cell 956
biomaterial 776
biomembrane 705, 707, 928, 929, 965
 transport 930
biosensor 507, 947
 bioaffinity 948, 958, 962
 glucose- 949, 953
 inhibitor 956
 potentiometric 204
biotin 948
bipolar electrode 563
 stack of 566
bipolar nanoelectrode 565
bipolar plate 75, 791, 860
 fuel cell 860
bipolaron 713
Bloch function 577
Bode plot 386
bottleneck principle 317
boundary condition 320
 Dirichlet 320
 Neumann 321
bridge
 Wheatstone 381

Brillouin zone 576
buffer
 phosphate buffer saline (PBS) 214
bulk 116
bulk electrolysis 358
Butler–Volmer equation 96, 326
 derivation 92
 for complex electrode reactionen 106
 interpretation 97
 limitation 108
 limiting cases 102
butylbenzaldehyde; *t*-butylbenzaldehyde 917

C

calibration 191
calomel electrode
 saturated 63
capacitance 840
 differential 826
 double layer 345
 pseudocapacitance 843
capacitive current 121
capacitive reactance 380
capacitor 121, 840
 breakdown voltage 840
 capacitance 846
 characterization 847
 electrical double layer 842
 electrochemical 792, 841
 charge balancing 846
 electrolytic 841
 electrostatic 841
 energy density 840
 ideal 380
 mechanism 842
capacity 792
 irreversible 830
 nominal 793
 specific 793
capillary gap cell 895
carbenium ion 907
carbon 897
carbon nanotubes 210
carboxylic acid 905
catalysis 337
 chemical 338
 heterogeneous 648
 homogeneous 648
 redox 338
catalyst 648
cathode 14
cathode electrolyte interphase (CEI) 836
cathodic protection 758
catholyte 21
cation pool method 916
CB. *see* conduction band
cell
 ATR- 368
 biologic 507
 biological 928
 capillary gap 895
 coin 810
 coplanar electrochemical 954
 divided 892
 droplet 753
 dye-sensitized solar cell 604
 electrochemical 13
 electrochemical for semiconductor 598
 electrolysis 12, 20
 EQCM 437
 for corrosion studies 752
 for single crystal electrodes 450
 for X-ray absorption spectroscopy 434
 galvanic 20
 H-cell 892
 IR spectroelectrochemistry 407, 414
 lead–acid 814
 metal–air 791
 non-rechargeable 790
 photocatalytic 602
 photosynthetic 601
 photovoltaic 601
 pouchbag 810
 primary 790, 805, 812
 quasi-divided 893
 rechargeable 790
 rolled 810, 895
 secondary 790, 805
 SPR 414
 SPR- reference beam 416
 stack 895
 Swagelok 810
 thin-layer 366, 367
 three-electrode 811
 undivided 891
 wall-jet 246
cell voltage 26, 816
 at equilibrium for Daniell cell 43
 equilibrium 26
 fuel cell at equilibrium 46
 open circuit voltage 26
 standard 36, 41
 standard equilibrium 37
CELT confined etchant layer technique 504

1006 | *Index*

- cermet 870
- C–H acidity 637
- charge 16, 359, 361
 - effective 175
 - relative 614
- charge balancing 846
- charge carrier
 - majority 584
 - minority 584
 - mobile 12
- charge factor 798
- charge separation 33, 48
- charge transfer 86, 122
- charge transfer reaction 50
- chemical deposition 539
- chlorate 888, 899
- chlorine 888
- chromatography 360
 - ion-exchange 640
 - micellar electrokinetic 179
- chronoamperometry 161, 255, 306, 361, 546
 - growth of independent nuclei 544
 - metal deposition 546
 - nucleation 542
- chronocoulometry 306, 344
 - double potential step 344
- Clark electrode 248
- clay 716
- cluster of defects 620
- cluster size
 - critical 542
- coating
 - conformal 552
- cofactor 937
- coin cells 810
- collection efficiency 673
- combination pH electrode. *see* glass membrane electrode
- compartmentalization 929
- complex numbers 378
- complexation 243
- complexing agent 770
- complexing capacity 245
- composites 563
- comproportionation 328, 335
- concentration 39
 - critical micelle 179
 - interfacial 250
 - of defects at equilibrium 622
 - relative 103
- concentration gradient 158, 219
- concentration profile 161, 167, 314, 321
- conduction band 572
- conductive polymer
 - adhesion promoter 713
 - copolymer 713
 - deposition 712
 - EQCM 713
 - morphology 711
- conductivity 120
 - at infinite dilution 126
 - electronic 614
 - equivalent 127
 - ionic 614
 - limiting 126
 - mixed 254, 614, 627
 - molar 125, 142
 - specific 120, 125
 - molar, Table 134
- conductivity coefficient 126, 142
- conjugate addition 729
- constant phase element (CPE) 394, 396, 849
- contact layers 624
- control parameter 306, 347
- convection 116, 182, 319, 350, 782
- conversion 16
 - chemical 12
- conversion efficiency
 - energy 76
- convolution integral 166, 345
- coordination compound
 - of ruthenium 349
- coordination network compounds 716
- coordination sphere 87
- copolymer 713
- copper
 - raffination 888
- corrosion 507, 739–741
 - acid 749
 - atmospheric 761, 762
 - brass 772
 - chemical 743
 - conditions 742
 - crevice 769
 - element formation 764
 - external 742
 - galvanic 770
 - general 751, 761, 764
 - high-temperature 627
 - immunity 747
 - in salt solution 764
 - inhibitor 760
 - intergranular 770, 771
 - internal 742
 - intragranular 770

kinetics 750
metal-physical 743
microbiologically induced 770
of alloys 750, 771
oxygen 749
passivity 747, 750, 755
pitting corrosion 765
prerequisite 742
shallow pit formation) 764
socioeconomic relevance 741
stress corrosion cracking 770
uniform 750, 751, 761, 764
corrosion damage 741
corrosion failure 741
corrosion fatigue 770
corrosion inhibitor 760
corrosion mechanisms
 uniform corrosion 750
corrosion medium 760
corrosion phenomenon 741, 760
corrosion potential, free 750
corrosion protection 739, 758
 anodic 759
 cathodic 758
 coating 760
 modification of the corrosion medium 760
corrosion rate 627
corrosion system 743
Cottrell equation 163, 165, 314, 362
Cottrell plot 164
coulometry 358, 361
Coulter counter 969
coupling reactions
 oxidative 905
 reductive 908
coverage 468
COVID-19 963
C-rate 796
Creutz–Taube complex 330
criterion
 diagnostic 361
critical dimension 263
cross coupling 906
cross-linking 948
crystal face 443
crystal structure 101
crystallographic misfit 539
Cu protein 938
current 16
 anodic 19
 background 226
 capacitive 226, 351, 721

 cathodic 19
 DC 12
 diffusion-limited 102, 228
 direction 19
 faradaic 226, 351, 721
 oxidative 19
 reductive 19
 steady-state 259
current clamp technique 966
current collector 790, 818
current density 18, 811
 exchange 97, 99, 195, 896
 net 97
 partial 561
current density distribution 891
 primary 551, 811, 893
 secondary 551
 tertiary 551
current dips 341
current efficiency
 bipolar 565
current flow 12
current follower 284
current yield 634
 see faradaic efficiency 781
current–overpotential curve 98
cyclic voltammetry 216
 cross over 536
 curve crossing 340
cyclic voltammogram
 initial 353
 ultimate 354
cycloaddition 919, 920
cyclobutane 919
cyclooctatetraene 328
cytochrome *c* 932

D

Dahms–Ruff equation 725
Damascene process 559
Daniell cell 33
 equilibrium cell voltage 43
 temperature dependence 43
deactivation 709
dead stop indication 248
dealloying 772
Debye–Hückel theory 138
Debye length 139
decay constant 723
deep eutectic solvent 638
defect
 anti-Frenkel 615

1008 | *Index*defect (*Continued*)

anti-Schottky 615
 complex 620
 extrinsic 618
 Frenkel 615
 intrinsic 617
 kink site 446
 line defects 620
 plane 620
 Schottky 615
 step 445
 surface 447
 defect cluster 620
 denaturation 940
 dendrimer 330
 density
 of valence electron 575
 density functional theory 660
 density of states 479, 575, 659, 665
 depletion layer 590
 depolarizer, *see* analyte
 deposition
 electrophoretic 641, 949
 descriptor 661, 663
 desoxyribonucleic acid (DNA) 962
 detection
 capacitive 961
 impedimetric 961
 diagnostic criterium 308, 346
 diamond, boron-doped (BDD) 210, 898
 diaphragm process 900
 diaphragm 893
 dichloromethane 902
 dielectric 841
 dielectric constant 122
 Diels–Alder reaction 729
 differential concentration cell 770
 differential equations
 partial 165, 319, 320
 differential pulse voltammetry 230
 diffraction
 low energy electron 435
 X-ray 434
 diffusion 116, 154, 304, 346
 edge effect 350, 362
 planar 164, 260, 319, 544
 self- 362
 semi-infinite 250, 320
 semi-infinite planar 365
 transport- 362
 diffusion coefficient 158, 316, 326, 344, 348, 361, 362
 apparent 725

diffusion control 313, 316
 diffusion layer 117, 162, 318, 323, 359
 hemispherical 266, 544
 Nernst 183, 228
 diffusion potential 53, 196
 diffusion velocity
 mean 156
 diffusion-limited current 344
 digital–analog converter 281
 dimensionally stable anode (DSA) 898, 899
 dimethylformamide (DMF) 902
 dimethylsulfoxide (DMSO) 902
 dipole 117
 dip-pen nanolithography (DPN) 700
 direct ethanol fuel cell (DEFC) 866
 direct methanol fuel cell (DMFC) 866
 direct transition 579
 dislocation 620
 dispersion
 of time constants 395
 dispersion layer 536
 disproportionation 328, 335, 349
 distribution coefficient
 Donnan 55
 divided cell 892
 DNA. *see* desoxyribonucleic acid (DNA)
 DNA origami 963
 Donnan potential 54
 doping
 heterogeneous 631
 homogeneous 627, 631
 double layer, *see* electrical double layer
 double-layer capacitance 122, 345
 differential 465
 integral 465
 double potential step chronocoulometry 344
 drinking water 641
 droplet cell 753, 775
 duty cycle 781

E

Ebonex 898
 EC number 939
 edge dislocation 620
 edge effect 164, 311, 350
 effect
 entropic 329
 statistical 329
 efficiency
 coulombic 19, 798, 805
 cycling 799
 energy 805

- faradaic 19, 634
- round trip 799
- voltage 805
- eigenvalues
 - energy 574
- Einstein equation 159
- Einstein–Smoluchowski equation 158
- electrocatalyst.activity 650
- electric constant 122
- electric field strength 118
- electrical double layer 94, 117, 121, 351, 457
 - capacitance 145, 345
 - compact 146, 470
 - diffuse 147, 470
 - model of Stern 472
 - properties 145
 - structure 146
- electroanalytical method 189
 - absolute 191
 - dynamic 190, 207
 - primary. *see* methods: absolute
 - relative 191
 - static 190
- electrocapillary equation 464
- Electrocatalysis
 - activity 667, 669
 - carbon dioxide reduction reaction 681
 - CO 681
 - d-band model 665
 - ethanol 681
 - formic acid 680
 - heterogeneous 649, 896
 - Heyrovský reaction 652
 - homogeneous 649, 912
 - hydrogen evolution reaction 651, 666
 - intermediate 648, 651
 - methanol 680
 - nanoparticle 667
 - oxygen evolution reaction 678
 - oxygen reduction reaction 662, 672, 678
 - selectivity 651, 673
 - support 667
 - Volmer–Heyrovský mechanism 660
 - Volmer–Tafel mechanism 662
- electrocatalyst
 - copper 681
 - for oxygen reduction reaction 664
 - N-coordinated metal centers 679
 - oxide 679
 - Pt 679
 - stability 680, 865
- electrochemical bioanalytics 946
- electrochemical cell
 - with transference 52
- electrochemical impedance 377, 848
 - electrode with porous coating 392
 - measurement 383
 - partially blocked electrode 391
 - porous electrode 392
- electrochemical impedance spectroscopy (EIS) 377, 848, 863
 - local (LEIS) 513
- electrochemical machining (ECM) 780
- electrochemical noise analysis (ENA) 769
- electrochemical potential 30
- electrochemical series 27
- electrochemical system 305
- electrochemical window 308
- electrochemically active surface area (ECSA) 861
- electrochemistry
 - molecular 303, 326
- electrocodeposition 536, 563
- electrocrystalization 539
- electrode
 - adsorption site 445
 - alloy 49
 - auxiliary 208, 210
 - bipolar 563, 895
 - blocked 725
 - boron-doped (BDDE) 898
 - carbon paste 949
 - carbon nanotube 949
 - characterization of single crystal e. 450
 - conductive glass 605
 - defects at singly crystal e. 447
 - diffusionally independent electrodes 278
 - dropping mercury 226
 - ECSTM of single crystal e. 453
 - gas diffusion (GDE) 838, 860, 896
 - glass membrane 193
 - glassy carbon 210
 - graphene 949
 - Hg 229
 - DME 462
 - inert 210
 - insertion 73, 254, 441, 716
 - interdigitated electrode array 279
 - ion-selective (ISE) 192
 - LaF₃ 199
 - lead-IV-oxide–lead sulfate 70
 - LEED of single crystal e. 453
 - liquid membrane 199
 - materials 896
 - membrane 192
 - mercury 212

1010 | *Index*electrode (*Continued*)

- mercury film 241
 - metal ion 16
 - microdisk. *see* microelectrode 266
 - modified 689, 717
 - multireaction 57
 - Na⁺-sensitive 638
 - neutral carrier membrane 201
 - nonuniformly accessible 260
 - of the first kind 15, 49
 - of the second kind 16, 45, 49, 63
 - of the third kind 16
 - optically transparent 365
 - optically transparent thin-layer (OTTLE) 941
 - paraffin-impregnated graphite 253
 - partially blocked 255, 391
 - pH 193
 - pH-sensitive 638
 - polymer-modified 707
 - porous 392, 815, 896
 - potential of zero charge of single crystal e. 466
 - preparation of single crystal e. 448
 - pyrolytic graphite 944
 - recessed 265
 - reconstruction of single crystal e. 447
 - reference 208
 - relaxation of singly crystal e. 447
 - rotating 896
 - single crystal 443
 - silicon 823
 - silver-silver chloride 965
 - superstructure on single crystal e. 452
 - template stripped gold film 449
 - three-phase 253, 255
 - uniformly accessible 265, 669
 - with electron transfer 50
 - with porous coating 392
 - without faradaic reaction 384
 - working 208, 210
- electrode area
- geometric 123, 146, 362
 - microscopic 146
 - true 122, 146
- electrode body 210
- electrode fouling 709
- electrode material
- boron-doped diamond (BDD) 898
 - carbon 897
 - iron 897
 - lead 897
 - mercury 897
 - nickel 897
 - platinum 896
 - stainless steel 897
- electrode potential 27
- standard 37, 66
- electrode pretreatment
- electrochemical polishing 211
 - mechanical polishing 210
- electrode reaction 13, 304
- electrodeposition 536
- abnormal codeposition 562
 - alloys 560
 - codeposition by complexation 563
 - composites 563
 - GMR layers 563
 - Janus particle 565
 - multilayers 563
 - normal codeposition 562
 - superconformal 559
 - throwing power 552
- electrodialysis 641
- electrodics 13
- electrodimerization 332
- electrohydrodimerization 332
- electrolysis 507
- alkaline (AEL) 881
 - bulk 358
 - chlor-alkali 898
 - galvanostatic 358, 359
 - Kolbe 905
 - molten-salt 634
 - non-Kolbe 907
 - polymer electrolyte membrane (PEMEL) 880
 - potentiostatic 358
 - solid oxide (SOEL) 881
 - water 879
- electrolyte 117, 791
- dilution of weak 127
 - gel 639
 - glass 638
 - polyelectrolyte 640, 707
 - polymer 639
 - strong 117
 - supporting 182
 - weak 117
- electrolyte solution 901
- for organic and metalorganic compounds 215
 - for trace analysis 214
 - for voltammetry 214
 - organic 307
- electrolyte systems 902
- electrolyte-supported cell (ESC) 868, 872
- electron affinity 584, 587

- electron density 101, 575
- electron diffusion 725
- electron energy loss spectroscopy 410
- electron microscopy 475
- electron stoichiometry 35
- electron transfer 304, 725
 - adiabatic 657
 - direct 940, 944
 - direct (with glucose oxidase) 945
 - dissociative 331
 - heterogeneous 87
 - homogeneous 87, 304
 - intramolecular 919
 - mediated 940, 942
 - nonadiabatic 657
- electron transport chain 932
- electronically conducting polymers
 - break-in effect 443
- electroosmotic flow (EOF) 565, 893, 969
- electrophoresis 169, 565
 - capillary (CE) 174
 - native 170
 - two-dimensional 173
- electrophoretic deposition 641
- electrophoretic effect 143
- electrophoretic paint 539
- electrophysiology 965
- electroporation 931
- electrosorption valency 456, 660
- electrosynthesis 887
 - direct 905, 911
 - electroenzymatic 912
 - indirect 911
 - Kolbe electrolysis 905
 - non-Kolbe 907
 - organic 903
 - paired 916
 - rapid polarity inversion 907
- ellipsometry 410
 - imaging 412
- Eloxal process 776
- emulsion 903
- end point indication
 - dead stop indication 248
- energy 792
 - electrostatic interaction 140
 - specific 792
- energy band 572
 - band structure plots 572, 578
- energy barrier 91
- energy density 792
- energy efficiency 799, 894
- energy vector 791
- enthalpy
 - of formation 41
- entropic effect 329
- entropy
 - of configuration 622
 - of formation 41
- enzyme 507, 638
- equation
 - Arrhenius 91
 - Butler–Volmer 326
 - Cottrell 314, 362
 - Dahms–Ruff 725
 - Einstein 159
 - Einstein–Smoluchowski 158
- electrocapillary 464
- Fresnel 412
- Gibbs–Duhem 461
- Gibbs–Helmholtz 36
- Henderson–Hasselbalch 38
- Koutecký–Levich 670
- Levich 670
- Mott–Schottky 593
- Nernst 33, 36
- Nernst–Einstein 159
- Nikolskij–Eisenman 197
- Poisson 470, 631
- Poisson–Boltzmann 470, 631
- Randles–Ševčík 313
- Sauerbrey 438
- Schrödinger 319, 574
- Stokes–Einstein 159
- Vogel–Fulcher–Tammann 639
- Wagner–Traud 754
- equilibrium
 - comproportionation 335
 - dynamic 91
 - electrochemical 34
 - isomerization 337
 - ligand exchange 337
 - nernstian 332
 - protolysis 355, 357
 - protonation 337
- equivalent circuit 122, 384, 391
 - quartz crystal microbalance (EQCM) 438
 - Randles 387
- equivalent conductivities 134
- error function 163
- error function complement 163
- evaluation
 - direct 343, 347
- Evans diagram 750–752

1012 | *Index*

excess quantity 459
 exchange current density 896
 excitation signal 320
 exfoliation 832
 extra conductivity 810

F

factor
 preexponential 91
 faradaic current 121, 226
 Faraday
 first law 16
 Faraday constant 17
 Faraday's First Law 18
 Faraday's law
 first 16, 359
 second 17, 359
 Fermi level 580
 Fermi level pinning 590
 Fermi resonance 405
 ferredoxin 934
 ferrocene 311, 362
 FeS cluster 938
 Fick's first Law 157, 314, 323
 Fick's second law 160
 field
 evanescent 415
 film pressure 701
 film transfer techniques 704
 finite element method 322
 fitting 349, 356
 fixed-bed reactor 566
 flavine 936
 flotation 691
 flow
 electroosmotic (EOF) 177, 893, 969
 flow field 75, 791, 860
 fluidized bed reactor 896
 fluorosulfonic acid 902
 flux, (particle) flux 157
 following reaction 314
 force constant 401
 formal potential 47, 326, 348
 distribution of 725
 formalism by Gerischer 109
 formation 818, 832
 Fourier transform (FT) analysis 382
 four-point measurements 624
 Franck-Condon principle 109, 653
 Frank-van der Merwe growth 539
 frequency 380
 frequency factor 91

frequency response analyzer (FRA) 382
 Fresnel's equations 412
 Frumkin correction 474
 Frumkin effect 473
 Frumkin isotherm 724
 FTO 605
 fuel cell 69, 73, 507, 791, 857
 aging 864
 alkaline (AFC) 875
 anode-supported (ASC) 872
 anode-supported cell (ASC) 868
 biological 956
 bipolar plate 860
 catalyst loading 867
 crossover 866
 direct ethanol (DEFC) 866
 direct methanol (DMFC) 866
 electrode 860
 electrolyte-supported (ESC) 872
 electrolyte-supported cell (ESC) 868
 gas diffusion layer (GDL) 860
 high-temperature polymer electrolyte membrane (HT-PEMFC), 867
 metal-supported (MSC) 868, 872
 microporous layer 860
 molten carbonate 634
 molten carbonate (MCFC) 873
 noble metal-free 868
 overview 73, 857
 phosphoric acid (PAFC) 875
 polymer electrolyte membrane 73, 859
 simulation 862
 solid oxide (SOFC) 78, 868
 unitized regenerative 791
 working curve 79, 861
 fuel utilization rate 799
 fugacity 41
 function generator 281

G

2D DIGE 174
 galactosidase 960
 Galvani voltage 48
 at membranes 53
 electrodes with ion transfer 48
 stationary 53
 thermoelectric voltage 51
 galvanic cell 20
 galvanic displacement 537
 galvanic series 27
 Galvanostat 208, 285
 gas diffusion electrode 860

gas diffusion layer (GDL) 75, 791, 860
 gas diffusion layer 75
 gas pocket 901
 gas sensor 631
 gas-diffusion electrodes (GDE) 75, 838, 860, 896
 Gibbs adsorption isotherm 460
 Gibbs energy of formation
 molar 41
 Gibbs free energy 28
 molar standard 36
 Gibbs free energy of reaction
 molar 35
 Gibbs' phase rule 813
 Gibbs–Duhem equation 461
 Gibbs–Helmholtz equation 36, 92
 glass 638
 glass electrode. *see* glass membrane electrode
 glass membrane electrode 193
 glass transition 639
 glassy carbon 210
 glucose oxidase 942, 960
 glucose sensor 949, 953
 Gouy–Chapman layer. *see* electrical double layer, diffuse
 grain boundary 443, 620, 771
 graphene 210
 Grotthuss mechanism 128
 growth of nuclei 544
 of independent n. 544
 of interacting n. 544
 Guggenheim square 458

H

half-cell 21
 half-peak potential 327
 half-wave potential 227, 228
 hanging Hg drop electrode 230
 Haring–Blum cell 553
 heat engine 76
 Helmholtz layer 146
 inner 150
 Helmholtz plane
 inner 150
 outer, 147
 heme group 938
 Henderson–Hasselbalch equation 38
 Henry's law 203
 heterogeneous doping 631
 hexafluoroisopropanol 902
 Heyrovský reaction 652
 high temperature polymer electrolyte fuel cell (HT-PEMFC) 867
 high-temperature corrosion 627
 high-voltage spinel 836

Hodgkin–Huxley model 967
 Hofmeister series 200
 hole 573, 618
 holoenzyme 939
 HOMO 572
 homogeneous doping 631
 homogeneous reaction 304
 HSAB concept 557
 Hull cell 550
 humic matter 640
 hybridization 962
 hydrodynamic boundary layer 117
 hydrogel 726, 949
 hydrogen atom abstraction 355
 hydrogen electrode
 dynamic 64
 reversible 63
 standard (SHE) 27
 hydrogen embrittlement 536, 743, 758
 hydrogen evolution reaction (HER) 100, 536, 651, 748, 758, 816
 hydrogen fluoride 902
 hydroxyl radical 604
 hyperbolic functions 472

I

imaginary term 378
 immobilization 948
 immunity 746, 747
 immunoassay
 electrochemical 958
 formats 959
 immunoglobuline. *see* antibody
 impedance 381
 electrochemical 377, 384, 391, 392, 848
 measurement 381
 partially blocked electrode 391
 Warburg 388
 impedance spectroscopy 601, 624
 electrochemical (EIS) 377, 848, 863
 equivalent circuits 384
 practise 383
 implant
 metallic 776
 impurity 347, 352
 indirect transition 579
 infrared reflection absorption spectroscopy 402
 inhibition 473
 initial condition 320
 injection
 electrokinetic 175
 hydrodynamic 175
 insertion electrode 441, 716

1014 | *Index*

intensity-modulated photocurrent spectroscopy IMPS 601
 intensity-modulated photovoltage spectroscopy 601
 interaction
 adsorbate–adsorbate 724
 intercalation electrode 254
 interface 13
 liquid–liquid 613, 903
 interface between two immiscible electrolyte
 solutions 52, 613
 interface between two miscible electrolyte
 solutions 52
 interionic interaction 136
 intermediate 317, 648
 interphase 254, 459
 interstitial sites 614
 inversion layer 590
 ion 14
 central 138
 ion channel 965, 967
 ion cloud 138
 ion electrode 15
 ion mobility 118, 124, 623
 ion pair 126, 902
 ion product of water 67
 ion-conductor 12
 ion-exchange membrane 893
 ion-exchanger 640, 709
 ion-selective electrode (ISE)
 limit of detection 196
 selectivity 196
 ionic liquid 536, 613, 635, 902
 ionic product 582, 618
 ionic radius
 hydrodynamic 134
 ionic strength 136
 ionics 13
 ionization energy 584, 588
 IR compensation
 current interrupt 288
 positive feedback 287
 IR drop 311, 345, 357, 367, 672
 avoidance 209
 compensated 286
 correction 210, 291
 uncompensated 209, 361, 672
 IR spectroscopy
 application 407
 orientation analysis 404
 PM IRRAS 406
 SNIFTIRS 406
 surface selection rule 403
 iron 897

irreversibility
 chemical 100, 306, 317, 331
 electrochemical 100, 314
 isoalpha point 342
 isoelectric focusing 171
 isopoints 342
 isopotential point 341
 isotherm
 film pressure 703
 Frumkin 469, 724
 Henry 468
 Langmuir 468
 Temkin 469
 ITIES 52, 613
 ITO 605

K
 Karl Fischer titration 247
 Kelvin probe 513
 corrosion at metal–polymer interface 514
 with scanning force microscopy 514
 kinetic dispersion 725
 kinetic parameter 347
 kinetics
 of charge transfer 90
 of electron transfer 346
 kink 536
 kink site 446
 Kolbe electrolysis 905
 Koopman's Theorem 424
 Koutecký–Levich equation 670
 Kroegeer–Vink notation 614
k-vector 574

L
 lab on the chip 181
 Langmuir layer 700
 Langmuir trough 700
 Langmuir–Blodgett transfer 704, 706
 Langmuir–Schaefer transfer 704, 706
 Laplace transformation 165
 lattice
 real-space 443–446, 454, 571
 reciprocal 454, 574
 law
 Fick's first 314, 323
 mass action 127, 328
 of independent migration of ions 127
 layer growth 547
 layered oxide materials 834
 lead 897
 lead–acid accumulator, *see* lead–acid battery

lead–acid battery 70, 798, 814
 additive 819
 side reactions 815
lead–acid cell. *see* lead–acid battery
LEED 435
 superstructure 453
leveler 552
Levich equation 670
limit of detection 241
limited current 359
linear free energy relationship 661
linear sweep voltammetry (LSV) 225
lipid bilayer 724, 929
Lissajous curves 381
lithium-ion battery (LIB) 73, 802, 810, 820
 aging 836
 electrolyte 828, 833
 negative electrode 822
 positive electrode 834
 safety 800, 832
 solid electrolyte 628
 structure 821
lock-in amplifier 509, 513, 514
LUMO 572

M

Maclaurin series expansion 163
Marcus theory 109, 652
 inverted region 658
 reorganisation energy 655
 symmetry factor 657
Marcus–Hush theory 327, 652
mass action law 328
mass loss rate 751
mass spectrometry 360, 675
 DEMS 675
 electrospray ionization 675
 laser desorption 435
 secondary ion 435
mass transfer. *see* mass transport
mass transport coefficient 102, 183
mass transport 85, 115, 358
 limitation 102, 224, 258, 670
mass utilization 812, 815
matrix effect 242
measurement uncertainty 350
mechanism
 of a reaction, *see* reaction mechanism 303
mediator 338, 339, 911–913, 932, 936, 937, 941
 redox 709, 728, 833
membrane 383, 507, 948
 biological 705, 707, 928, 929, 965
 biomimetic 705, 707
 bipolar 642
 ion-exchange 640, 893
 model 705, 707
 potential difference 931
membrane electrode
 liquid membrane with ion-exchanger 200
 neutral carrier 201
membrane electrode assembly (MEA) 75, 791, 860, 868, 871,
 872, 880
membrane process 641, 900
membrane separation process 641
membrane voltage 54
memory effect 819
menaquinone 936
mercury 212, 226, 229, 813, 897, 899
metabolism sensor 948
metal
 nanoporous 772
metal chalcogenides
 chemical deposition 539
metal deposition
 additive 556
 bath composition 554
 complexation 243
 currentless 537
 galvanic 536
 microstructure 548
metal dissolution, active 756
metal hexacyanometallate 716
metal oxide
 nanoporous layer 776
metal structure 443, 771
metal–air battery 791, 837
metal–hydrogen bond energy 100
metal supported cell (MSC) 868, 872
metallization
 printed circuit boards 559
micell 179, 490, 705
micro total analysis system, μ TAS 181
microcontact printing (MCP) 699
microconvection 250
microelectrode 255, 259, 266, 362, 492
 analytical features 271
 array 278
 carbon fiber 275
 characterization 269
 disk 264
 fabrication 268
 nanoelectrode 269
 recessed 271
 sensor 273
 spherical 263
microreactor technology 894

1016 | Index

microsensor
 voltammetric 273
 migration 116, 117
 migration velocity 118
 Miller indices 444
 mitochondrion 929
 mixed potential 107, 191, 750
 model
 mathematical 318, 320
 physicochemical 319
 model mechanism 306, 312, 318, 326
 model reaction mechanism 342
 modeling 318, 496
 ECM 783
 modified electrode 689
 conjugate addition 729
 Diels–Alder reaktion 729
 electrochemical activation 728
 kinetics 720
 permeable film 726
 Schiff base 729
 thermodynamics 719
 voltammetry 717
 modulation technique 509, 513
 molality 40
 standard 40
 molality activity coefficient 40
 molar Gibbs free energy of activation 92
 mole fraction 40
 molecular orbital 572
 molten carbonate fuel cell (MCFC) 873
 molten-salt electrolysis 536, 634
 momentum vector 575
 monolayer 689
 alkylsilane 696
 Langmuir layer 700
 patterned 699
 potential of zero charge of self-assembled m. 467
 reduction of aryldiazonium salts 697
 self-assembled (SAM) 690, 713, 948
 XPS of self-assembled m. 430
 Monsanto process 908
 Mott–Schottky equation 593
 mutagenesis, site-directed 938

N

N,N,N',N'-tetramethylphenyldiamine (TMPD) 331
 Na amalgam 899
 Na-alcoholate 899
 nanoelectrode 258
 bipolar 565
 fabrication 269

nanoparticle 667, 861
 collision frequency 256
 size determination 257
 nanoshaving 700
 neopolarogramm 345
 Nernst diffusion layer 183, 228, 554, 670, 745
 Nernst Equation 33
 Nernst factor 37, 97, 312
 Nernst–Einstein equation 159
 nernstian equilibrium 100, 332
 net reaction rate 91
 nickel 536, 819, 897
 Raney 897
 nicotinamide adenine dinucleotide phosphate (NADP+) 937
 nicotinamide dinucleotide (NAD+) 937
 Nikolskij–Eisenman Eq. 197
 nitrobenzene 902
 nitrogen
 reactive nitrogen species (RNS) 276
 nitromethane 902
 N-methylpyrrolidone (NMP) 803, 902
 NMR, nuclear magnetic resonance 626
 noise analysis
 see electrochemical noise analysis (ENA) 769
 non-Kolbe electrolysis 907
 nonequilibrium phenomenon 52
 normal pulse voltammetry 237
 normal vibrations 401
 normalized quantity 38, 312, 494
 nuclear configuration 92
 nuclear magnetic resonance (NMR)
 pulsed-gradient spin-echo nuclear magnetic resonance
 (PGSE-NMR), 362
 nucleation
 instantaneous 543
 kinetics 542
 thermodynamics 540
 Nyquist plot 386

O

2,2',3,3',4,4',5,5'-octamethylbipyrrole (OMB) 354
 ohmic drop. *see* IR drop
 ohmic microscopy 513
 ohmic resistance 120
 ohmic resistor 379, 380
 olefin metathesis 919
 Onsager theory 143
 onset voltage 26
 open-circuit photo voltage 606
 open-circuit potential (OCP) 107, 191, 325, 353
 open-circuit voltage 53, 191, 861
 operational amplifiers 282

operator 165
optically transparent thin-layer electrode (OTTLE) 941
optimization
 nonlinear 346
orbital
 atomic 572
 molecular 572
orthogonal collocation 322
oscillator
 harmonic 654
Osteryoung square wave voltammetry 232
Ostwald's dilution law 127
outer Helmholtz plane 147
overpotential 89, 99
 charge transfer 90
 diffusion 90
 nucleation 90
 reaction 90
oxidation 13, 14, 20
oxidation state 344
oxidative coupling reactions 905
oxide
 transparent conductive 365
oxide film
 by pH shift 538
oxidoreductase 339
oxygen
 reactive oxygen species (ROS) 276
oxygen corrosion 749
oxygen depolarized cathode 900
oxygen reduction reaction
 selectivity 679
oxygen reduction reaction (ORR) 749, 816
oxygen sensor 248

P

palladium hydride electrode 64
parameter
 control 349
 kinetic 347
 reaction 305
parting limit 772
passive film 768
passive layer 627, 742, 765
passivity 746, 747, 750, 755
 breakdown of 768
 unstable 757
 passive range 756
 stable 757
 transpassive range 756
patch clamp method 965
patch clamp technique 968
PCR *see* polymerase chain reaction (PCR)
peak current 309
 ratio of 314
peak potential
 difference of 309, 346, 361
permittivity
 absolute 122
 relative 122
 vacuum 122
peroxidase 960
pH electrode, *see* glass membrane electrode 193, 946
phase boundary
 between three phases 205, 253, 742, 743, 802, 860, 869, 870
phase rule 813
phasor diagram 380
phosphatase, alkaline 960
phosphoric acid fuel cell (PAFC) 875
photocurrent measurement 599
photoelectrochemistry 507
photopotential transients 601
photosynthesis 928
 proton motive force (pmf) 933
photosystem I 934
photosystem II 933
piezoelectric effect 436
pinhole 719
place exchange 725
plasmon 414
plasticizer 639
plastocyanin 934
plastoquinone 934, 936
plating 536–563
 immersion 537
platinum 58, 74, 100, 210, 896
 availability 78, 679
 platinized 123, 897
 single crystal 451
point defect 614, 616
Poisson equation 147, 631
Poisson–Boltzmann equation 631
polarity inversion 920
polarography 225
polaron 713, 715
poly(ethylene oxide) 639
poly(vinyl ferrocene) 425
polyaniline 710, 714, 715
polycrystal, 443
Polyelectrolyte 640
 layer-by-layer adsorption (LbL) 707
polymer 330
 conductive 712, 713
 doping 710

1018 | *Index*

- polymer (*Continued*)
 film 707–715, 949
 insulating 708
 intrinsically conductive 709
 ion-exchanger 709
 on electrode 707
 redox 709, 954
 polymer electrolyte 639
 polymer electrolyte membrane electrolysis (PEMEL) 880
 polymer electrolyte membrane fuel cell (PEMFC) 859
 noble metal-free 868
 polymer-modified electrode 707–715
 EQCM 442
 polymerase chain reaction (PCR) 180, 962
 polyoxometallate 716
 polyphenol 708
 polypyrrole 710, 713, 714
 polythiophene 710
 potential
 chemical 28
 electrochemical 28–33
 electrode 27
 formal 47, 94
 Galvani 31
 half-peak potential 327
 inner 29
 mixed 57
 of zero charge 101, 465
 open-circuit (OCP) 325, 353
 outer 31
 rest. *see* potential:open-circuit
 standard electrode 47
 surface 31
 switching 353
 switching in CV 216
 Volta 31
 potential drop. *see* IR drop
 potential of zero charge 465
 single crystal electrode 466
 solid electrode 466
 potential order
 inverted 334, 340, 349
 normal 328, 354
 potential scan rate 216, 312
 potential window 352, 353
 potential–pH diagram. *see* Pourbaix diagram potentiometry
 potentiometry 68, 191
 direct 68
 potentiostat 208, 280, 285
 faults 291
 pouchbag cell 810
 Pourbaix diagram 744–746, 748
 of aluminum 747
 of iron 748
 of magnesium 745
 of water 744
 significance 748
 power 792
 specific 792
 power density 792
 prepeak 333
 pressure
 partial 41
 propylencarbonate 902
 prosthetic group 937
 protein
 immobilization 948
 membrane 930
 transport 930
 proteomics 173
 proton motive force (pmf) 930
 cellular respiration 931
 photosynthesis 933
 Prussian Blue 716
 pseudocapacitance 146, 842
 pulse deposition 553
 pyridine 902
 pyrroloquinoline-quinone (PQQ) 936
- Q**
- quantity
 extrinsic 306, 347
 intrinsic 305, 343, 347
 normalized 312, 321
 quantum size effects 603
 quartz crystal microbalance
 application 439
 AT cut 436
 electrochemical (EQCM) 436
 equivalent circuit 438
 influences 438
 viscoelastic film 440
 quasireversibility 314, 346
 quasi-Fermi level 601
 quasi-particle 573
 quasi-stationarity 317
- R**
- radiation
 near-infrared 364
 ultraviolet 364
 visible 364
 radical addition 906
 radical cation 919
 radical–radical coupling 332

- radical–substrate coupling 332
- Ragone plot 796
- Raman spectroscopy 408
 - surface-enhanced 409
- Randles equivalent circuit 387
- random access memory 629
- Raney nickel 897
- rate capability 804
- rate constant 326
 - heterogeneous 346
 - heterogeneous standard 96
 - heterogeneous standard rate constant of electron transfer, 346
 - homogeneous reaction 90
 - standard heterogeneous 316
- rate-determining step (RDS) 88, 314, 326
- reactance
 - capacitive 380
- reaction
 - chemically irreversible 100
 - electrochemical 13
 - electrochemically irreversible 100
 - equilibrium 90
 - following reaction 314
 - heterogeneous 17
 - homogeneous 17
 - inner sphere 88
 - multistep 88
 - outer sphere 87
 - redox-neutral 919
 - reversible 100, 309
- reaction coordinate 92, 648
- reaction enthalpy
 - molar 36
 - molar standard 36
- reaction entropy
 - molar 36
 - molar standard 36
- reaction kinetics
 - electrochemical 107
- reaction layer 912, 942
- reaction mechanism 308, 325
 - CE 333, 334
 - EC 314, 316, 331–333
 - ECE 315, 316, 332, 334, 336
 - EC' 338, 944
 - EE 315, 328, 349, 364
 - E_{rev} 309
 - ETC 336
 - fence scheme 337
 - homogeneous electrocatalysis 337
 - ladder scheme 337
 - mesh scheme 337
 - model 342, 346
 - square scheme 336, 337
 - $S_{\text{RN}}1$ 336, 340
- reaction order 332
- reaction progress coefficient 34
- reaction rate 18
 - exchange 91
 - heterogeneous 18
 - homogeneous reaction 91
 - momentary 18
- reaction step
 - chemical 304
 - concerted 304, 331
 - heterogeneous 304
 - homogeneous 304
 - primitive 304
 - rate-determining 314, 326
- reaction zone 338
- real term 378
- recognition element 946
- recombination 603, 606
- rectification
 - ionic current 509
- redox catalysis 338, 912
- redox cycle 933
- redox electrode 15
- redox enzyme 339
- redox flow battery (RFB) 791, 839
- redox mediator 604, 709, 728, 833
- redox polymer 709, 954
- redox protein 940
- redox reaction
 - amino acid 938
 - cofactor 938
 - homogeneous 335
 - protein 938
- redox shuttle. *see* redox mediator
- redox shuttling 280
- redox system
 - immobilized 249, 314
- redox tag 919
- reduced mass 401
- reduction 13, 14, 20
- reductive coupling reactions 908
- reference electrode 26, 58, 63, 208
- reference spectrum 365
- reflection
 - law of 412
- relaxation effect 143
- reorganization energy 328
- reproducibility 241

1020 | *Index*

resistance
 specific 120
 resistor
 ohmic 379, 380
 respiration 928
 cellular 933
 cellular and proton motive force (pmf) 931
 reverse pulse voltammetry 237
 reversibility 361
 chemical 309
 electrochemical 309
 ribonucleic acid (RNA) 962
 ring-forming reaction 906
 RNA. *see* ribonucleic acid (RNA)
 Robin–Day classification 330
 rolled cell 895
 rotating disk electrodes 259, 669
 rotating ring–disk electrode 669
 ruthenium complex 349

S

Sabatier principle 101, 661
 sacrificial anode 758, 896
 salt bridge 21
 scaling relationship 663
 scan rate 216, 307
 scanning electrochemical cell microscopy (SECCM) 511
 scanning electrochemical microscopy (SECM) 492
 AC-SECM 513
 application 507
 chemical lens 504
 coupling to ECSFM and ECSTM 506
 direct mode 503
 electrochemical time-of-flight setup 503
 feedback mode 493
 generation-collection mode 500
 instrumentation 492
 redox competition mode 502
 shear force measurement 506
 surface interrogation mode 498
 scanning electron microscopy 475
 scanning force microscopy
 application 490
 cantilever 484
 contact mode 485
 dynamic mode 486
 electrochemical 483
 film thickness 491
 force volume mode 490
 force–distance curves 488
 forces 484
 intermittant contact mode 487
 lateral force microscopy 486
 principle 483
 scanning ion-conductance microscopy (SICM) 509
 scanning photocurrent microscopy 508
 scanning photoelectrochemical microscopy. *see* scanning photocurrent microscopy
 scanning probe microscopy
 artifact 478, 490
 constant distance mode 477
 constant height mode 477
 image representation 477
 overview 478
 principle 476
 Scanning tunneling microscopy
 application 481
 electrochemical 480
 electrochemical (ECSTM) 152
 principle 479
 superstructure 453
 surface modification 482
 scanning tunneling spectroscopy 480
 Schiff base
 modified electrode 729
 Schrödinger equation 319, 574
 screen printing 949, 954
 screw dislocation 547, 620
 second harmonic generation 410
 secondary ion mass spectrometry 435
 depth profile 435
 SEI. *see* solid electrolyte interphase
 selectivity 890
 selectivity coefficient
 potentiometric 197
 self-assembled monolayer (SAM) 690, 713, 948
 electrochemistry 695
 defect 693
 mixed 698
 preparation 691
 structure 693
 self-diffusion 157
 self-discharge 799
 semi-integration 344, 345
 semiconductor
 contacting 598
 degenerate 590
 direct transition 579
 doping 584
 extrinsic 574
 gap states 588
 indirect transitions 579
 intrinsic 574
 n-type 584

- p*-type 585
 - oxide 586
 - sulfide 586
 - surface states 588
 - suspension 602
- semiconductor electrode 109
- sensitivity 241
- sensitizer 604
- sensor
 - amperometric 245
 - amperometric for end point indication 246
 - amperometric lambda probe 205
 - bioaffinity 948, 962
 - chemical 68
 - glucose 949, 953
 - in flow systems 246
 - metabolism 948
 - potentiometric lambda probe 204
 - potentiometric biosensor 204
 - potentiometric gas s. 202
- separation buffer 178
- separation process
 - elektrokinetic 641
- separation techniques
 - electrokinetic 169
- separator 790, 833, 892
- short-circuit photocurrent 606
- silicon
 - porous 601
- silicon electrode 823
- silver–silver chloride electrode 45, 49, 965
- SIMS 435
- simulation 318
 - explorative 346
 - exploratory 323, 326
 - fuel cell 862
- simulator
 - electrochemical 323, 325, 347
- single entity electrochemistry 255, 968
- slope analysis 237, 268
- sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) 171
- soft lithography 699
- solar cell
 - dye-sensitized 604, 605
- solid electrolyte interphase (SEI) 822, 828, 830
- solid oxide electrolysis (SOEL) 881
- solid oxide fuel cell (SOFC) 868
 - anode material 870
 - cathode material 869
 - membrane 869
 - membrane electrode assembly (MEA) 871
- solid-state membrane electrode 199
- solution
 - ideal 39
 - molten 633
 - solid 254
- solution-precipitation mechanism 801, 815
- solubility product 67
- solvation effect 315
- solvent 351, 360, 901
 - deep eutectic 638
- space charge region 590, 603
- space–time yield 894
- speciation 243
- speciation analysis 202
- specific conductivity 125, 623
- spectroelectrochemistry, 364, 402
 - IR 406
 - Raman spectroscopy 408
 - reflection 368
 - reflection mode 368
 - second harmonic generation 410
 - SERS 409
 - sum frequency generation SFG 410
 - X-ray absorption spectroscopy 430
- spectrometer
 - diode array 365
- spectroscopy
 - ion scattering 435
 - vibrational 401
- spinel oxide 835
- square scheme 336, 337
- square wave voltammetry 232
- SRET, scanning reference electrode technique 513
- stability range 745
- staging 824
- stainless steel 897
- staircase cyclic voltammetry 235
- staircase voltammetry 311
- staircase cyclic voltammetry (SCV) 306
- standard activity 39
- standard addition 242
- standard hydrogen electrode 27, 58
- start potential 352
- state
 - physical 15
- static Hg drop electrode 230
- statistical effect 329
- steady state 260, 338
- steady-state approximation 338
- steel
 - glass-forming 773
 - stainless 773, 897
- step bunching 547
- stoichiometric number of charges 359, 361, 362

1022 | Index

stoichiometric number of electrons 17, 344

Stokes–Einstein relation 159

Stranski–Krastanov growth 540

stripping voltammetry

abrasive 253

adsorptive 241

anodic 240

cathodic 241

structural disorder 624

subsequent reactions 726

sulfation

irreversible 818

sum frequency generation 410

super ionic conductivity 624

supercapacitors 792, 842

supercaps 792, 842

supersaturation 544

superstructure 153, 452, 693, 824

support 667

supporting electrolyte 360, 902

surface

defects 447

reconstruction 154, 447

relaxation 447

single crystal electrode 444

surface analysis

ex situ 399

in situ 399

operando 401

surface charge 462

surface diffusion 540

surface dipol 31

surface plasmon resonance 414

application 416

surface selection rule 403

surface states 588

surface tension 460

surfactants

ionic 179

Swagelok cell 810

Swiss roll cell. *see* cell, rolled

switching potential 353

symmetry coefficient. *see* transfer coefficient

synchrotron radiation 419, 432

T

Tafel reaction 652

Taylor series expansion 161

template-stripped gold 449

tensammetry 239

tetraphenyl-1,4-dithiin 360

thermodynamically superfluous reaction (TSR) 356

thermodynamics

irreversible 624, 928

thin film electrode

adhesion promoter 437

thin-layer voltammetry 250, 721

three-electrode cell 307, 811

three-phase boundary 205, 253, 742, 743, 802, 860,
869, 870, 900

three-phase electrode 253, 255

throwing power 538, 552

time constant 122, 271, 377

time scale 217, 307, 315, 326, 331, 346, 350, 354, 361

tip–substrate voltammetry 502

TISAB (total ionic strength buffer) 197

titration

conductometric 135

Karl Fischer 247

potentiometric 68

trajectory 154

transducer 946

transfer coefficient 95, 101, 326

transfer function 283

transference 52

transference number 131

Hittorf's method of determination 132

Table 133

transition dipole moment 403

transition state 92, 654

transmission electron microscopy 475

operando 475

STEM 476

transparent conducting oxide (TCO) 605, 691

transport 115, 186, 304, 361

transport diffusion 158

transport process

irreversible 52

triple phase boundary. *see* phase boundary:three-phase

trumpet plot 722

TSR, thermodynamically superfluous reaction 325

tunneling process 653

decay constant 653

U

ubiquinone 936

ultrahigh vacuum (UHV) 400

ultramicroelectrode 258

ultrasound 896

ultraviolet photoelectron spectroscopy (UPS) 418

umpolung 920

uncompensated resistance 209

underpotential deposition 456, 539

hydrogen 668

undivided cell 891

uniform corrosion 750

V

valence band 572
vanadium redox flow battery (VRFB) 839
VB. *see* valence band 572
vector diagram 380
vertical interconnect access (VIA) 559
vesicle 705, 706
viscosity 670
volcano plots 100, 661, 663, 664
Volmer reaction 652
Volmer–Weber growth 540
Volta's pile 69
voltage
 open circuit 79
 thermoelectric 52
voltage clamp technique 966
voltage follower 284
voltaic efficiency 799
voltametry. *see* potentiometry
voltammetry 191, 281
 abrasive stripping 253
 alternating current 238
 cell vials 215
 complexation 243
 cyclic 216
 data quality 350
 differential pulse 230
 fast-scan cyclic 274
 hydrodynamic 246
 modified electrode 717
 normal pulse 237
 of immobilized microparticles 252
 reverse pulse 237
 square wave 232
 staircase 235
 staircase cyclic (SCV) 306
 thin-layer 250, 721
 tip–substrate 502
 trace analysis 214
voltammogram
 exploratory 308, 353

W

Wagner number 552
Wagner–Traud equation 754
wall-jet cell 676
water
 ultrapure 134
water electrolysis 798, 879
water-gas shift reaction 858
wave function
 Bloch function 577

 bound electrons 576
 nodal plane 578
wave vector
 angular 574
Weston cell 26
Wheatstone bridge 381
Wigner–Seitz cell 576
Wilhelmy plate 701
Winand diagram 548
work function 101, 584, 587
working curve 346, 723
 fuel cell 861
working electrode 208, 210, 307
Wurster's blue 331

X

X-ray absorption spectroscopy 430
 EXAFS 433
 XANES 433
X-ray diffraction 434
X-ray photoelectron spectroscopy (XPS) 418
 angle-resolved 428
 background 418
 charge compensation 426
 chemical shift 424
 depth profiles by sputtering 429
 designation of lines 423
 final state effects 425
 information depth 419
 initial state effects 424
 laboratory radiation source 421
 multiplet splitting 425
 near-ambient pressure 418
 peak asymmetry 425
 plasmon 426
 qualitative analysis 423
 quantitative analysis 427
 radiation damage 430
 sample transfer 421

Y

yield 19, 634
yttrium-stabilized zirconium dioxide 619

Z

zeolite 716
zeta-potential 149
zinc oxide 627
zinc–carbon cell 812
zone diagram 316, 327, 335













