Index

Acid Black decolorization, 103
acoustic focal area, 277
acoustic streaming, 29, 48, 81–2
acoustoelectrochemical cell, 53
activation overpotential, 10
activity, 6
adsorptive stripping, 80
alkaline fuel cells (AFCs), 302
alloy nanoparticles, 295–6
aluminium
  nanoparticles, 289–90
  sonoeclectrochemical etching, 239–40
5-aminosalicylic acid
  sonoeclectroanalysis, 85
amperometry, 17–20
  chronocoulometry, 17
  electrolysis, 17–19
anodic stripping voltammetry (ASV), 81
Apfel and Holland model, 46–8
aromatic derivatives, sonoeclectrochemical degradation, 108–14
arsenic
  sonoeclectroanalysis, 84
ascorbic acid
  sonoeclectroanalysis, 84
Bayer–Villiger reaction, 160
benzaldehyde reduction, 146–8
benzoic acid reduction, 147
Besançon cell, 189
biogeochemistry, 88–9
biphasic analysis, 92–3
bismuth-modified electrodes, 91
Blake pressure, 46
Blake threshold, 47
border effect, 230
boron-doped diamond (BDD) electrode, 103, 109–11
Brilliant Red X-3B decolorization, 103
bubble motion, 48
bubble skin effects, 50
Butler–Volmer equation, 6, 7
cadmium
  nanoparticles, 290
  sonoeclectroanalysis, 84, 85
catalyst-coated membrane (CCM), 319
cathodic current, 4
cathodic efficiency, 176
cavitation, 25, 227
  bubble implosion sequence, 31
  microjets, 30, 37
  turbulent flow, 29–30
cavitation bubble dynamics, 45, 73
  bubble behaviour, 46–8
  electrochemistry next to tethered permanent gas bubble, 51–5
erosion events from inertial cavitation, 67–73
  mass transfer effects, 48
  mass transfer from forced permanent gas bubble oscillation, 55–62
  mass transfer from single inertial cavitation bubbles, 62–5

© 2012 John Wiley & Sons, Ltd. Published 2012 by John Wiley & Sons, Ltd.
Index

cavitation bubble dynamics (Continued)
   non-inertial cavitation under ultrasonic horn, 65–7
   single mechanisms for mass transfer enhancement, 48–51
   cavitation corrosion effect, 219
   cavitation erosion effect, 219
   cell construction, 34–6
   cell potential, 3
   centrifugal electrolytic cell, 253–4
   charge transfer resistance, 8
   chemical processing applications of macrosonis, 23
   chlorinated pollutants,
      sonoelctrochemical degradation, 104–8
   p-chlorophenyl acetate oxidation, 155–6
   1,1-bis-(4-chlorophenyl)-2,2,2-trichloroethane, 143
   chronocoulometry, 17
   cleaning applications of macrosonis, 23
   cleaning using ultrasound, 26
   clinical samples, trace metals, 90–1
   coating of electrodes, 157–61
   cobalt
      nanoparticles, 287
      sonoelectrodeposition
         microscopic properties, 181, 182
   colony-forming units (CFUs), 129
   concentration overpotential, 9–10
   convection, 14
   copper
      deposition, 62
      electroless deposition, 200
      non-conductive substrates, 201–9
      nanoparticles, 288
      sonoelctroanalnyis, 84, 85
      sonoelectrodeposition
         macroscopic properties, 177
         microscopic properties, 180
         unconventional solvents, 187–95
      wastewater removal, 122–3
      wastewater removal
         EDTA complexes, 124–5
      core shell particles, 290–2
      corrosion
         classification, 224–6
            ASTM classification, 227
         control technology, 217
            corrosion acceleration factors, 217
         corrosion testing, 217
            laboratory tests, 218
            definition, 215
            economical impact, 216
            electrochemical study, 222–3
            experimental study of corrosion-cavitation mechanisms and parameters, 229–31
            setup, 228–9
         forms, 223
         influence of ultrasound on metal corrosion, 231–2
            general corrosion, 232–40
            passivity of metals, 240–2
         mechanisms
            electrochemical principles, 220–1
            nature of, 215–16
            protection, 269–72
            rate of corrosion, 221–2
         sonication studies
            cavitation corrosion, 219
            cavitation erosion test, 219
            synergistic effect of corrosion and cavitation, 219–20
         ultrasound accelerated corrosion testing, 242
            atmospheric corrosion of zinc plated steel, 242–3
            oilfield corrosion inhibitor evaluation, 243–7
            stainless steel, 243
            surgical implant materials in body fluids, 244
            corrosion fatigue test, 218
            counter electrode (C.E.), 4
            crevice corrosion, 224
            cyanide
            wastewater treatment, 127–9
<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>cyclic voltammetry (CV)</td>
<td>11–14</td>
</tr>
<tr>
<td>irreversible reactions</td>
<td>13–14</td>
</tr>
<tr>
<td>quasi-reversible reactions</td>
<td>12–13</td>
</tr>
<tr>
<td>reversible reactions</td>
<td>12</td>
</tr>
<tr>
<td>cyclohexane carboxylate oxidation</td>
<td>151–3</td>
</tr>
<tr>
<td>cyclopentadienyl titanium pentaselenide</td>
<td>150</td>
</tr>
<tr>
<td>dealloying</td>
<td>226</td>
</tr>
<tr>
<td>decomposition voltages</td>
<td>10</td>
</tr>
<tr>
<td>deep eutectic solvents (DESs)</td>
<td>188</td>
</tr>
<tr>
<td>determination of overpotentials</td>
<td>10–11</td>
</tr>
<tr>
<td>decomposition voltages</td>
<td>10</td>
</tr>
<tr>
<td>discharge potentials</td>
<td>10–11</td>
</tr>
<tr>
<td>diagnostic ultrasound</td>
<td>21</td>
</tr>
<tr>
<td>di-azo dyes</td>
<td>103</td>
</tr>
<tr>
<td>dibutydiglyme (DBDG)</td>
<td>288</td>
</tr>
<tr>
<td>dichloroacetic acid (DCAA)</td>
<td>106</td>
</tr>
<tr>
<td>2,4-dichlorophenol</td>
<td>104</td>
</tr>
<tr>
<td>2,4-dichlorophenoxyacetic acid (2,4-D)</td>
<td>104, 116–19</td>
</tr>
<tr>
<td>didodecyldimethyl ammonium bromide (DDAB)</td>
<td>143</td>
</tr>
<tr>
<td>diffusion</td>
<td>14</td>
</tr>
<tr>
<td>2,4-dihydroxybezoic acid (2,4-DHBA)</td>
<td>111</td>
</tr>
<tr>
<td>1,3-dinitrobenzene</td>
<td>108</td>
</tr>
<tr>
<td>2,4-dinitrotoluene</td>
<td>108</td>
</tr>
<tr>
<td>dip dry test (DDT)</td>
<td>243</td>
</tr>
<tr>
<td>direct methanol fuel cells (DMFCs)</td>
<td>302</td>
</tr>
<tr>
<td>direct transmission of energy</td>
<td>22</td>
</tr>
<tr>
<td>discharge potentials</td>
<td>10–11</td>
</tr>
<tr>
<td>doping</td>
<td>272–6</td>
</tr>
<tr>
<td>Eisenberg equation</td>
<td>15–17</td>
</tr>
<tr>
<td>electric double layer</td>
<td>1, 2</td>
</tr>
<tr>
<td>electro- and electroless deposition</td>
<td>38, 39</td>
</tr>
<tr>
<td>copper coating on non-conductive substrates</td>
<td></td>
</tr>
<tr>
<td>influence of acoustic power</td>
<td>203–7</td>
</tr>
<tr>
<td>influence on coating properties</td>
<td>207–9</td>
</tr>
<tr>
<td>sonoreactor</td>
<td>202–3</td>
</tr>
<tr>
<td>surface preparation</td>
<td>201</td>
</tr>
<tr>
<td>electroless process</td>
<td>198</td>
</tr>
<tr>
<td>ultrasound effects</td>
<td>198–200</td>
</tr>
<tr>
<td>electroanalysis</td>
<td>38</td>
</tr>
<tr>
<td>electroanalytical techniques</td>
<td>11</td>
</tr>
<tr>
<td>amperometry</td>
<td></td>
</tr>
<tr>
<td>chronocoulometry</td>
<td>17</td>
</tr>
<tr>
<td>electrolysis</td>
<td>17–19</td>
</tr>
<tr>
<td>voltammetry</td>
<td>11</td>
</tr>
<tr>
<td>cyclic voltammetry (CV)</td>
<td>11–14</td>
</tr>
<tr>
<td>hydrodynamic voltammetry</td>
<td>14–17</td>
</tr>
<tr>
<td>electrochemical corrosion tests</td>
<td>218</td>
</tr>
<tr>
<td>electrochemical impedance spectroscopy (EIS)</td>
<td>223</td>
</tr>
<tr>
<td>electrochemical noise (EN)</td>
<td>223</td>
</tr>
<tr>
<td>electrochemical spectrum</td>
<td>11</td>
</tr>
<tr>
<td>electrochemical technology (ECT)</td>
<td>101</td>
</tr>
<tr>
<td>electrochemistry</td>
<td>1, 27–8</td>
</tr>
<tr>
<td>electron-transfer kinetics</td>
<td>2–10</td>
</tr>
<tr>
<td>principles</td>
<td>1–2</td>
</tr>
<tr>
<td>electrode activation</td>
<td>251–5</td>
</tr>
<tr>
<td>electrode potentials</td>
<td>3</td>
</tr>
<tr>
<td>electrodeposition process</td>
<td>173</td>
</tr>
<tr>
<td>characterisation techniques</td>
<td>175</td>
</tr>
<tr>
<td>important parameters</td>
<td>173–5</td>
</tr>
<tr>
<td>electrolysis</td>
<td>17–19</td>
</tr>
<tr>
<td>constant potential</td>
<td>20</td>
</tr>
<tr>
<td>important parameters</td>
<td>18–19</td>
</tr>
<tr>
<td>electron-transfer coefficient</td>
<td>7</td>
</tr>
<tr>
<td>electron-transfer kinetics</td>
<td>2–10</td>
</tr>
<tr>
<td>electroorganic synthesis</td>
<td>144</td>
</tr>
<tr>
<td>electrooxidations</td>
<td>151–7</td>
</tr>
<tr>
<td>electroreductions</td>
<td>144–49</td>
</tr>
<tr>
<td>organochalcogenides</td>
<td>149–51</td>
</tr>
<tr>
<td>electropolymerisation</td>
<td>249–51</td>
</tr>
<tr>
<td>ultrasound irradiation</td>
<td>259–62</td>
</tr>
<tr>
<td>electrosynthesis</td>
<td>40</td>
</tr>
<tr>
<td>emulsions</td>
<td>27</td>
</tr>
<tr>
<td>environmental applications of sonoelectrochemistry</td>
<td>101, 134</td>
</tr>
<tr>
<td>degradation of persistent organic pollutants (POPs)</td>
<td>102</td>
</tr>
<tr>
<td>aromatic and phenolic derivatives</td>
<td>108–14</td>
</tr>
<tr>
<td>chlorinated pollutants</td>
<td>104–8</td>
</tr>
<tr>
<td>nitro compounds</td>
<td>108</td>
</tr>
</tbody>
</table>
environmental applications of sono electrochemistry (Continued)
textile dyes, 102–3
wastewater with high organic content, 114–15
metal recovery and toxic inorganic compound treatment, 121–9
soil remediation, 130–4
water disinfection by hypochlorite generation, 129
environmental protection, 39, 88–9
equilibrium potential, 3
erosion events from inertial cavitation, 67–73
Escherichia coli, 129, 267–9
ethylenediaminetetraacetic acid (EDTA), 124
copper complexes, 124–5, 180
3,4-ethylenedioxythiophene (EDOT), 252, 255, 256–7
exchange current, 4
exchange current density, 7
Eyring equation, 6
Faradaic current, 5
Faradaic resistance, 8
Faraday constant, 18
Faraday wave, 46, 57
image, 58
Faraday’s law, 5, 221
Fenton reaction, 115–16
field applications of sonotrode, 93
film properties, effects of ultrasound, 262
doping, 272–6
mass-transfer effect, 262–4
morphology effect, 264–5
biological applications, 265–9
corrosion protection, 269–72
surface local control effects, 276–8
forced permanent gas bubble oscillation, 55–62
frosted bubble, 59
fuel cells
electrodes, 318–19
industrial fabrication, 319–20
noble metal sonoelectrochemical production, 311–14
effect of aqueous solutions, 317–18
effect of surfactants and alcohols, 315–17
fuels cells, 301–3
Galton, 21
galvanic corrosion, 224
gas diffusion electrode (GDE), 319
gas diffusion layer (GDL), 319
general corrosion, 224
influence of ultrasound
aluminium etching, 239–40
effect on electrochemical behaviour of steel, 235–6
effect on electrochemical behaviour of various alloys, 232–5
resistance of metals in water, 232
zinc, 236–9
gold
nanoparticles, 258, 292–5, 309
sonochemical production, 312, 313
Helmholtz planes
inner (IHP), 1, 2
outer (OHP), 1, 2
high intensity focused transducers (HIFUs), 182, 261
Hofer–Moest reaction, 151
human osteosarcoma cell line Saos-2 267, 268
hybrid sonoelectrochemical techniques
ozonation, 120–1
sono electro- Fenton (SEF), 115–19
hydrodynamic voltammetry, 14–17
hydrodynamics, 161–2
hydrogen
sonoelectrochemical production, 303–5
hydrogen cells, 301–3
hydrogen evolution reaction (HER), 304
hypochlorite generation for water disinfection, 129
immersion corrosion tests, 218
indirect transmission of energy, 22
inertial cavitation, 46
inner Helmholtz plane (IHP), 1, 2
interfacial region, 1
intergranular corrosion, 225
iridium
  sonoelctrodeposition
  macroscopic properties, 179
iron
  corrosion (rusting), 220–1
  nanoparticles, 287
irreversible reactions, 13–14

Klebsiella pneumonia, 129
Kolb reaction, 141, 151
Koutecky–Levich equation, 17

Langevin, 21
Langmuir trough, 54–5
lead
  nanoparticles, 290
  sonoelectroanalysis, 84, 85
  microscopic properties, 181
Levich equation, 15
limiting current density, 33
linear polarization resistance (LPR), 222–3
Lissamine Green B decolorization, 103
low-temperature effects, 162–3

machining applications of macrosonics, 23
macrosonics, 22
  industrial applications, 23
magnesium
  nanoparticles, 288–9
manganese
  sonoelectroanalysis, 85
mass transfer coefficient, 262
Maxililon Blue decolorization, 103
mean depth of penetration (MDP), 231
mean depth of penetration rate (MDPR), 231
mechanically assisted corrosion tests, 218
medical imaging, 22
mercury
  sonoelectrodeposition
  microscopic properties, 181

metal forming applications of macrosonics, 23
metal plating
  benefits of ultrasound, 172–3
  need for, 169–70
  process and technology, 170
  sonoelctrodeposition, 173
  characterisation techniques, 175
  contact angles, 205
  electroless deposition, 198–209
  important parameters, 173–5
  influence of acoustic energy distribution on coatings, 182–7
  influence of ultrasound on copper electrodeposition, 187–95
  macroscopic ultrasonic effects on electrodeposited coating properties, 175–9
  microscopic ultrasonic effects on electrodeposited coating properties, 179–82
  particle incorporation, 195–7
  plating rates, 203–4, 206
  sonoreactor, 183
metal quantification, 89–90
metal recovery with sonoelctrochemistry, 121–9
metal welding applications of macrosonics, 23
methanol halide reduction, 148–9
Methyl Orange decolorization, 103, 120–1
Methylene Blue decolorization, 103
microbial fuel cells (MFCs), 302
microjets, 30, 37, 48, 51
micromosaic electrode, 50
microstreaming, 48, 49
migration, 14
Minnaert equation, 46
molten carbonate fuel cells (MCFCs), 302
mono-azo dyes, 103
multibubble sonoluminescence (MBSL), 70, 71–2
nanomaterials, 39, 40, 283–6, 296
  alloy nanoparticles, 295–6
  experimental configurations, 286–7
nanomaterials (Continued)
  polymer nanoparticles, 296
pure metals
  aluminium, 289–90
  cobalt, iron and nickel, 287
  copper, 288
  core shell nanoparticles, 290–2
  gold, 292–5
  lead and cadmium, 290
  magnesium, 288–9
  silver, 287–8
  tungsten, 295
nanopowder production, 37
Nernst equation, 3, 6–7
diffusion layer model, 33, 82
nickel
  electroless deposition, 199
  nanoparticles, 287
  sonoelectrodeposition
    macroscopic properties, 178
    microscopic properties, 180–1
nitrate
  sonoelectroanalysis, 85
nitrite
  sonoelectroanalysis, 84, 87–8
nitro compounds, sonoelectrochemical degradation, 108
N-nitroso compounds, 87
noble metals, 305
  fuel cell electrocatalysis, 311–14
    effect of aqueous solutions, 317–18
    effect of surfactants and alcohols, 315–17
  sonoelectrochemical bi-metallic synthesis, 309
    effect of surfactants and alcohols, 309–11
  sonoelectrochemical mono-metallic synthesis, 306
    effect of alcohols, 307–8
    effect of atmospheric gases, 308
    effect of sonification time, 308–9
    effect of surfactants, 306–7
    effect of ultrasonic frequency, 309
  sonoelectrochemical perovskite oxides
    synthesis, 311
  non-inertial cavitation, 46
  ohmic overpotential, 10
  ohmic resistance, 8
Ohm’s law, 8
oilfield corrosion inhibitor evaluation, 243–7
open circuit potential (OCP), 190
organic synthesis see electroorganic synthesis; sonoelectrosynthesis
organochalcogenides, 149–51
organoseelenium derivatives, 149
organotellurium derivatives, 149
Ostwald ripening, 317
outer Helmholtz plane (OHP), 1, 2
overpotential, 7, 8–9
  activation, 10
  concentration, 9–10
  determination, 10–11
    decomposition voltages, 10
    discharge potentials, 10–11
    ohmic, 10
  overpotential deposition (OPD), 190
  oxidation reactions, 151–7
  ozonation, 120–1
palladium
  nanoparticles, 306
  sonoelectrochemical production, 312, 313
  particle image velocimetry (PIV), 182
  particle incorporation into metal coatings, 195–7
  passivity of metals, 240–2
  perchloroethylene (PCE), 104
persistent organic pollutants (POPs)
  soil remediation, 130–4
  wastewater treatment, 102
degradation by sonoelectrochemistry
  aromatic and phenolic derivatives, 108–14
  chlorinated pollutants, 104–8
  nitro compounds, 108
textile dyes, 102–3
  wastewater with high organic content, 114–15
pesticide analysis, 87
phenol, 108
  sonoelectrochemical degradation, 110
phenolic derivatives, sonoelectrochemical degradation, 108–14
phenyacetate oxidation, 154–5
phenyl-2,3-dihydro-1,4-diazepinium reduction, 158–9
phenylhydroxylamine, 108
phosphoric acid fuel cells (PAFCs), 302
piezoelectric effect, 21
pitting corrosion, 225
plastic welding applications of macrosonics, 23
platinum
sonochemical production, 312, 313
Pollet equation, 328
polyaniline (PANI), 250, 253
poly(N-chloroethanediyl) (PVC), 288
polychlorinated biphenyls (PCBs), 130
polycyclic aromatic hydrocarbons (PAHs), 130
poly(3,4-ethylenedioxythiophene) (PEDOT), 252–3, 257, 275–6
poly(N-vinylpyrrolidone) (PVP), 288
polymer nanoparticles, 296
polymerisation, 257–9
polypyrrole (PPy), 250–1, 253
films, 255, 266
doping–undoping properties, 260, 272–6
gold nanoparticle coating, 258
polytetrafluoroethylene (PTFE) particle incorporation into metal coatings, 195–7
polythiophene (PT), 250, 253
potential of zero charge (PZC), 86
potentiodynamic polarization, 222
potentiostatic electrode potential measurements, 4
power ultrasound, 21
applications using cavitation, 25–7
heterogeneous liquid/liquid reactions, 27
heterogeneous reactions at solid/liquid interface, 26–7
homogeneous reactions, 26
applications using direct transmission, 23
welding, 23–4
effect under mass transport conditions, 32–4
Procion Blue decolorization, 103
proton exchange membrane fuel cells (PEMFCs), 302
9H-pyrido(3,4-b)indole-3-carboxylic acid methyl ester (BCCM), 260
pyrone reaction, 160–1
quartz crystal microbalance (QCM), 291
quasi-reversible reactions, 12–13
Reactive Black 5 decolorization, 103
Reactive Blue 19 decolorization, 103
Reactive Brilliant X-3B decolorization, 103
redox processes, 3
reduction reactions, 144–49
reference electrode (R.E.), 4
reversible potential, 3
reversible reactions, 12
Reynolds number, 18–19, 174–5
Rhodamine B decolorization, 103
rhodium
sonochemical production, 312
room temperature ionic liquids (RTILs), 187–8, 290
copper reduction, 191–5
rotating disc electrode (RDE), 15–17, 105
silver recovery, 125–7
ruthenium
sonochemical production, 313
salt spray corrosion test, 218
Sandolan Yellow decolorization, 102–3
satellite electrodes, 50
saturated calomel electrode (SCE), 3
scanning electrochemical microscopy (SECM), 51, 52
Schmidt number, 19, 174–5
selective leaching, 226
Sherwood number, 174–5
shimmer on bubble surface, 59
342  Index

shock wave emission, 30–1
silver
    nanoparticles, 287–8
recovery from photographic fixative solutions, 124–7, 179, 181
sonochemical production, 312, 313
sonoeloelectrodeposition
    macroscopic properties, 179
    microscopic properties, 181–2
wastewater removal, 125–7
single electron transfer (SET), 254–5
single inertial cavitation bubbles, 62–5
soil remediation, 130–4
solid oxide fuel cells (SOFCs), 302
sonochemical technology (SCT), 101
    hybrid techniques, 115–21
sonochemistry, 21–3
sonocryoelectrochemistry, 162–3
sonoelectroanalysis, 39, 79, 93–4
    analytes, 84–5
    biogeochemistry, 88–9
    biphasic, 92–3
    field applications, 93
    metal quantification, 89–90
    pesticide analysis, 87
    trace metals in clinical samples, 90–1
sonochemical effects on electrode kinetics, 327–33
sonochemical technology (SCT), 101
sonochemistry, 27, 28–9, 320–1
applications, 38
    electro- and electroless deposition, 38
electroanalysis, 38
electrosynthesis, 40
environmental protection, 39
nanomaterials, 40
environmental applications, 101, 134
degradation of persistent organic pollutants (POPs), 102–21
metal recovery and toxic inorganic compound treatment, 121–9
soil remediation, 130–4
water disinfection by hypochlorite generation, 129
experimental methods, 34–40
cell construction, 34–6
electrode stability, 36–8
fuel cell electrodes, 318–19
    industrial applications, 319–20
hydrogen production, 303–5
noble metals, 305
    bi-metallic synthesis, 309–11
    mono-metallic synthesis, 306–9
    perovskite oxides synthesis, 311
    noble metals and fuel cell electrocatalysis, 311–14
effect of aqueous solutions, 317–18
effect of surfactants and alcohols, 315–17
ultrasonic factors, 29
    acoustic streaming, 29
    chemical effects, 31–2
    microjets, 30, 37
    shock wave emission, 30–1
    turbulent flow, 29–30
ultrasound and sonochemistry, 21–3
sonoeloelectrodeposition
    electrodeposition process, 173
    characterisation techniques, 175
    important parameters, 173–5
sonoeloelectrodeposition
copper coating on non-conductive substrates, 201–9
    process, 198
ultrasound effects, 198–200
influence of acoustic energy distribution on coatings, 182–7
influence of ultrasound on copper electrodeposition, 187–9
aqueous solutions, 189–91
RTILs, 191–5
macoosonic ultrasonic effects on electrodeposited coating properties, 175–9
metal plating
    benefits of ultrasound, 172–3
    need for, 169–70
process and technology, 170
sonoreactor, 183
Index 343

microscopic ultrasonic effects on electrodeposited coating properties, 179–82
particle incorporation, 195–7
ultrasound surface treatment cleaning prior to further treatments, 170–2
sono-electro-Fenton (SEF) reactions, 116–19
sono-electroorganic synthesis, 39
sono-electropolymerisation electrode activation, 251–5
electropolymerisation, 249–51
monomer solubilsation with ultrasound, 256–7
sono-electrosynthesis, 141–2, 163
early history, 143–4
electrode coatings, 157–61
other systems hydrodynamics, 161–2
low-temperature effects, 162–3
scale-up considerations, 142
sonotrode, 90, 93, 94
sonovoltammograms, 104
stable cavitation, 46
standard hydrogen electrode (SHE), 3
steel general corrosion, 235–6
passivity, 240–1
stainless steel, 243
Stern–Geary equation, 222
stress corrosion cracking (SCC) tests, 218, 226
stripping voltammetry, 79–81
surface treatment methods, 171
surgical implant material accelerated corrosion testing, 244
Tafel equations, 8–9
tandem acoustic emulsification processing, 257
tethered permanent gas bubble, 51–5
tetrahydrofuran (THF), 288
tetraphenylcyclopentadienone (tetracyclone), 160–1
textile dyes, sono-electrochemical degradation, 102–3
toxic inorganic compound treatment with sono-electrochemistry, 121–9
trace metals in clinical samples, 90–1
transient cavitation, 46
trichloroacetic acid (TCAA), 104–6
Trupocor Red decolorization, 103
tungsten nanoparticles, 295
ultrasound horn non-inertial cavitation, 65–7
ultrasound, 21–3
effect on soil pores, 133
ultrasound accelerated corrosion testing, 242
atmospheric corrosion of zinc plated steel, 242–3
oilfield corrosion inhibitor evaluation, 243–7
stainless steel, 243
surgical implant materials in body fluids, 244
ultrasound surface treatment cleaning prior to further treatments, 170–2
under potential deposition (UPD), 190
uniform corrosion, 224
vanadium sono-electroanalysis, 84
N-vinylcarbazole polymerization, 157–8
voltammetry, 11
cyclic voltammetry (CV), 11–14
wastewater treatment high organic content, 114–15
metal recovery and toxic inorganic compound treatment, 121–9
water disinfection by hypochlorite generation, 129
Index

welding using ultrasound, 23–4
machining, 24
metal forming, 24
working electrode (W.E.), 4
World Health Organization (WHO), 89

xanthate electrooxidation, 143

zinc
general corrosion, 236–9
sonoelectroanalysis, 84
sonoelectrodeposition
microscopic properties, 181
wastewater removal, 123–4
zinc plated steel, atmospheric corrosion, 242–3