

# Subject Index

## A

- A-C impedance measurement techniques, 137
- ALCAP ceramic cements, 377, 389
- Alloys (*see under specific metals*)
- Alpha-ketoglutaric acid, 377
- Alumina implants, 399
- Aluminum alloys, metal ion release from, 105, 151, 163, 389
- Aluminum-calcium-phosphorus oxide ceramic cements, 377, 389
- Alveolar ridge restoration, 359
- Anodic polarization, 31, 115
- Anorganic xenografts, 359
- ASTM F75 alloys
  - bending fatigue, 16
  - characterization measurement methods, 77
  - corrosion, 31, 124, 137, 167
  - fatigue integrity, 264
  - hot isostatic pressing treatment, 26
  - mechanical properties, 16, 47
  - metallurgical relationships, 60
  - porosity measurements, 77
- ASTM Standards
  - E 8-85: 49
  - F 67-83: 86, 106, 164
  - F 75-82: 16, 35, 47, 60, 77, 123, 141, 158, 164, 185, 264
  - F 86-84: 116, 141
  - F 90-82: 164
  - F 136-84: 86, 106, 141
  - F 138-82: 164
  - F 562-84: 165
  - F 563-78: 169
  - F 897-84: 165
  - G 5-82: 131, 145
- Atomic absorption, flameless, 151

## B

- Bending fatigue in tibial components, 16
- Bioceramics (*see Ceramics*)
- Biocompatibility, 151, 399

- Biocorrosion (*see Corrosion*)
- Biodegradation (*see also Corrosion*)
  - biological significance, 163
  - diminished by carbon coatings, 105
  - of hip prostheses, 151
- Biological analysis (*see Histological analysis*)
- Biomaterials, porous (*see specific materials*)
- Biomechanics, 241, 330
- Bonding
  - bone, 389
  - cement penetration, 303
  - cements, 377
  - surface-reactive biomaterials, 330
- Bone bonding, 330, 377, 389
- Bone defects, 370
- Bone gap healing, 370
- Bone ingrowth
  - in dental implants, 219
  - in flexible porous titanium, 303
  - in hip prostheses, 185
  - in porous implants subjected to electromagnetic fields, 286
- Bone remodeling
  - dental implants, 219, 241
  - hip prostheses, 185
  - total joint replacements, 207
- Bone repair, 370, 377, 389
- Bone stock deficiency, 303

## C

- Calcium hydroxide, effect on bone grafts, 370
- Calcium resorption, 390
- Carbide formation, in cobalt-chromium-molybdenum alloys, 60
- Carbon coatings, ultralow-temperature-isotropic, 105
- Carbon depletion in cobalt-chromium-molybdenum alloys, 60
- Cathodic polarization, 31
- Cement penetration, 303

- Cements, ceramic  
  aluminum-calcium-phosphorus oxide, 389  
  biodegradable, 377  
  resorbable and nonresorbable, 377  
  tricalcium phosphate, 377
- Ceramics  
  aluminum-calcium-phosphorus oxides, 389  
  glass, 330  
  tricalcium phosphate cements, 377
- Chromium  
  biological effects of ion release, 163  
  cobalt-chromium dental implants, 219  
  cobalt-chromium-molybdenum alloys  
    (*see under* Cobalt)  
  ion release from implants, 151, 163
- Coatings  
  adhesion to substrates of, 7, 124  
  carbon, 105  
  characterization measurement, 77, 92, 137  
  cobalt-chromium-molybdenum alloys  
    corrosion, 31, 124, 137, 167  
    hot isostatic pressing treatment, 26, 31, 47  
    metallurgical relationships, 60  
    porosity measurements, 77  
    sintering, 31, 47, 60, 124  
  fiber metal, 7, 77, 86, 124, 303  
  interface strength, 7  
  photoelastic coating technique, 249  
  plasma flame-sprayed, 77, 124, 276  
  polyethylene, ultrahigh-molecular-weight, 152  
  polysulfone, 264, 315  
  surface treatments for titanium implants, 276  
  tibial components, 16  
  titanium, 7, 124, 276
- Cobalt  
  ASTM F75 alloys (*see* cobalt-chromium-molybdenum alloys *herein*)  
  biological effects of ion release, 163  
  cobalt-chromium dental implants, 219  
  cobalt-chromium-molybdenum alloys  
    bending fatigue, 16  
    carbon depletion, 60  
    characterization measurement methods, 77, 187  
    corrosion, 31, 124, 137, 167  
    ductility, 60  
    fatigue integrity, 264  
    hot isostatic pressing treatment, 26, 31, 47  
    mechanical properties, 16, 31, 47, 60, 264  
    metallurgical relationships, 60  
    porosity measurements, 77, 185  
    sintering, 31, 47, 60, 124  
    ion release from implants, 151, 163  
    Vitallium alloys, 105
- Corrosion  
  characterization by A-C impedance techniques, 137  
  cobalt-chromium-molybdenum alloys, 31, 124, 137, 167  
  electrochemical corrosion analysis, 124  
  of hip prostheses, 151  
  metal ion release, 105, 151, 163  
  Ti-6Al-4V alloys, 124  
  titanium, carbon-coated, 105
- D**
- Dental implants  
  alumina, 399  
  bone ingrowth, 219  
  clinical performance indicators, 233  
  free standing, 399  
  hydroxyapatite and anorganic xenografts, 359  
  surface reactive (bioactive), 330
- Ductility, of cobalt-chromium-molybdenum alloys, 60
- E**
- Elastic properties, 303  
  Electrochemical corrosion analysis, 124  
  Electrodes, porous, 137  
  Electromagnetic stress fields, pulsed, effect on bone ingrowth, 286  
  Excretion of metal ions, 151, 163
- F**
- F75 alloys (*see* ASTM F75 alloys)  
  Fatigue  
    in ASTM F75 alloy, 47  
    bending, 16  
    integrity, 264  
    shear and tensile, of coating adhesion, 7  
  Femoral prostheses, 151, 185, 249, 264, 315  
  Fiber metal, 7, 77, 86, 124, 303  
  Fixation, biological  
    in dental implants, 219, 399  
    in flexible porous titanium, 303

in hip prostheses, 185  
in porous implants subjected to electro-  
magnetic fields, 286  
Flameless atomic absorption, 151  
Flexible porous titanium, 303  
Force transfer, 241, 249, 330  
Fumaric acid, 377

**G**

Glass ceramics, 330  
Grafts, bone, 370  
Grouts, hydroxyapatite, 377

**H**

Hard tissue replacement, 359, 370  
Hip prostheses (*see* Joint replacement)  
Histological analysis  
    biological fixation and bone modeling,  
    185, 276  
    bone ingrowth in dental implants, 219  
    electromagnetic fields, effect on bone  
    ingrowth, 286  
    metal ion release  
        biological significance, 163  
        diminished by carbon coatings, 105  
        from hip prostheses, 151  
    metal sensitivity, 151, 163  
    single-crystal alumina in dental implants,  
    399  
    surface treatments for titanium implants,  
    276  
Hot isostatic pressing treatment, 26, 31,  
47  
HTR polymer, 359, 370  
Hydroxyapatite, 359, 377

**I**

Image analysis, automated, 92, 347  
Impedance measurement techniques, A-C,  
137  
Implant loosening, 207  
Implant materials (*see under specific ma-  
terials*)  
Implants, dental (*see* Dental implants)  
Interface strength, between coatings and  
substrates, 7

**J**

Joint replacement (*see also* Corrosion)  
    animal testing, 185, 276, 286, 315  
    biocompatibility, 151

biodegradation, 105, 163  
bone ingrowth, 286, 303  
bone remodeling, 185, 207  
bone stock deficiency, 303  
femoral stems, 264, 315  
hip prostheses, 151, 185, 249, 264, 303  
load transfer and sharing, 241, 249  
radiographic criteria for clinical per-  
formance, 207  
surface treatments for titanium implants,  
276

**K**

Kiel bone, 370

**L**

Load transfer and sharing (*see also* Strain  
analysis), 241, 249, 330  
Loosening, implant, 207

**M**

Malic acid, 377  
Maxillofacial surgery (*see also* Dental im-  
plants), 389  
Measurement methods (*see also* Testing  
methods)  
    A-C impedance techniques, 137  
    image analysis, automated, 92, 347  
    pore characterization, 77, 92, 187, 347,  
    399  
Mechanical properties  
    cobalt-chromium-molybdenum alloys,  
    16, 31, 47, 60, 264  
    pore characterization, 77, 92, 187, 347,  
    399  
Metal alloys (*see under specific metals*)  
Metal ion release  
    biological significance, 163  
    diminished by carbon coatings, 105  
    from hip prostheses, 151  
Metal sensitivity, 151, 163  
Molybdenum alloys (*see under* Cobalt)  
Morphometry  
    biomaterials, surface reactive, at implant  
    interface, 330  
    porous coatings, 92  
Mutagenicity, 389

**N**

Nickel ion release, 151, 163

## O

- Oncogenicity, 163
- Oral surgery (*see also* Dental implants), 389
- Orthopedic prostheses (*see* Joint replacement)
- Orthophosphoric acid, 377

## P

- Pads, wire, 7, 77, 86, 124
- Passivation, of porous-coated Vitallium, 115
- Photoelastic coating technique, 249
- Plasma flame-sprayed coatings, 77, 124, 276
- Plaster of paris, 377
- Plastics (*see* Polymeric materials)
- Polarization, 31, 115, 137
- Polyethylene, ultrahigh-molecular-weight, 152
- Polyfunctional carboxylic acids, 377
- Polymeric materials
  - hard tissue replacement, 370
  - polyethylene, ultrahigh-molecular-weight, 152
  - polysulfone, 264, 315
- Polysulfone coatings, 264, 315
- Pores
  - connectivity, 347, 399
  - corrosion and mechanical effects of a porous coating, 31
  - density, 77, 92, 347
  - dimensions, 77, 92, 187, 347
  - distributions, 92, 347
  - volume porosity, 92, 187
- Porous coatings (*see* Coatings)
- Porous electrodes, 137
- Press fit, 264
- Pressing, hot isostatic
  - cast Co-Cr-Mo alloys, effect on, 31, 47
  - corrosion properties, effect on, 31
  - mechanical properties, effect on, 26, 31, 47
- Prostheses (*see* Dental implants; Joint replacement)
- Pulsed electromagnetic-induced currents (*see* Electromagnetic stress fields)
- Push-out tests, 286, 315

## Q

- Quantitative image analysis, 347

## R

- Radiological analysis, of uncemented total joint replacements, 207
- Replamineform biomaterials, 347
- Resorption, 389
- Revision surgery, 303

## S

- Shear strength, 7, 276
- Sigma phase, cobalt-chromium-molybdenum alloys, 60
- Sintering
  - cobalt-chromium-molybdenum alloys, 31, 47, 60, 124
  - Ti-6Al-4V alloys, 124
- Spinal fusion, 389
- Steels, stainless, ion release, table, 170
- Stereology, 92
- Strain analysis, proximal femur, 249
- Stress analysis, 137, 241, 264
- Stress shielding, 249
- Surface-reactive biomaterials, 330
- Surface treatments
  - carbon coatings, 105
  - hot isostatic pressing, 26, 31, 47
  - photoelastic coating, 249
  - plasma flame-sprayed, 77, 124, 276
  - polyethylene, ultrahigh-molecular-weight, 152
  - polysulfone, 264, 315
  - sintering, 31, 47, 60, 124
  - tibial components, 16
  - titanium implants, 276

## T

- Tensile strength
  - bone bonding, 330
  - cobalt-chromium-molybdenum alloys, 31, 60
- Testing methods
  - adhesion of coatings to substrates, 7
  - morphology of surface-reactive biomaterials at implant interface, 330
  - in vitro*, 16, 105, 389
- Tibial components, bending fatigue of, 16
- Tissue ingrowth fixation
  - in dental implants, 219
  - in flexible porous titanium, 303
  - in hip prostheses, 185
  - in porous implants subjected to electromagnetic fields, 286
- Tissue responses (*see* Histological analysis)

Titanium alloys  
 adhesion of coatings to substrates, 7  
 biological effects of ion release, 163  
 carbon coated, 105  
 corrosion in, 105, 124  
 dental implants, 219, 233, 330  
 electromagnetic fields, effect on bone ingrowth, 286  
 extralow interstitial alloys, 137  
 fatigue integrity, 264  
 fibrous coatings, 7, 77, 86, 124  
 flexible porous, 303  
 plasma-sprayed, 276  
 polysulfone-coated, 264, 315  
 surface-reactive (bioactive) biomaterials, 330  
 surface treatments (*see* Surface treatments)  
 wire mesh, 7, 77, 86, 124, 303  
 Tooth root, artificial, 399  
 Total hip replacement (*see* Joint replacement)  
 Toxicity of metal ions, 105, 151, 163

Trauma, 377  
 Tricalcium phosphate ceramic cements, 377

**U**

Urinary excretion of metal ions, 151, 163

**V**

Vanadium, metal ion release, 105, 151, 163  
 Vitallium, 115

**W**

Wire mesh, 7, 77, 86, 124, 303

**X**

Xenografts, 359  
 X-ray analysis, 207