

Subject Index

A

Abrasives
for advanced materials, 313
development, 313
diamond, 139

Advanced materials, microstructural analysis, 313

Aging, AL 9021, 344

AI (artificial intelligence), twin band identification, 243

Aluminum

AL 9021, microstructure and mechanical alloying, 344

in automotive materials, 109

Analytical transmission microscopes, development, 177

Artificial intelligence, twin band identification, 243

ASTM Committee E4

award winners, 23

chairmen, 34

history, 3, 83

officers, 4, 17

standards, 27

subcommittee chairmen, 19

subcommittees, 6

technical publications, 33

ASTM standards

Committee E4

history, 3

overview, 27

roles of, 83

E 15, 184

E 15-26T, 184

E 43, 184

E 43-42T, 184

E 81, 184

E 81-49, 184

E 81-77, 184

E 82-63, 184

E 112, 254

E 112-88, 243, 254

E 1181-87, 254

E 1382, 243

Auger spectroscopy, 88

Automotive materials, 109

Axle shafts, automotive, 109

B

Bainite, granular, in HSLA-100, 199

Body structures, automotive, 109

Brittle materials, ultrathin section techniques, 155

C

Cast iron, in automotive materials, 109

Ceramic composites, ultrathin section techniques, 155

Ceramics

in automotive materials, 109

microstructure analysis, 313

surface preparation, 139

ultrathin section techniques, 155

Chain structure, of electrorheological fluids, 372

Chipping, interfacial, 139

Chromized coatings, quantitative image analysis, 254

Cloud-piercing telescope, 88

Coatings, corrosion-resistant, quantitative image analysis, 254

Composite materials

microstructure analysis, 313

microstructure development, transparent model alloy system, 393

Copper-niobium alloy, powders, microstructure, 363

Copper precipitates, HSLA-100, TEM, 199

Corrosion-resistant coatings, characterization with image analysis, 254

Creep, Nb-2Y composites, 189

Cristobalite, reaction with titanium, 429

Crystal data, 184

Cubic boron nitride, 139

D

- Decarburization, subcommittee, 6
 Deformation, reduction in advanced materials, 313
 Dendritic systems, development, transparent model alloy system, 393
 Diamond grinding disks, 139
 Diffraction patterns, "d" spacings, 184
 X-ray, 184
 Disks, grinding, 139
 Distribution function, in electrorheological fluids, 372

E

- Edge rounding, 139
 Electrical system, automotive, 109
 Electrodes, automotive, 109
 Electron microprobe analysis, early development, 224
 Electron microprobes, 88
 Electron Microscope Micro Analyzer, 167
 Electron microscopy, early development, 224
 Electron Microstructure of Steels, subcommittee, 6
 Electron probe microanalyzer, 177
 Electron probes, static-beam, 167
 Electrorheological fluids, microstructure, 372
 Emission microscopy, E4 subcommittee, 6
 Energy dispersive spectroscopy, cast titanium in silica-containing investment mold, 429
 Eta phase, Fe-Zn couples, 212
 Etchants, for AL 9021, 344
 Eutectic systems, development, transparent model alloy system, 393
 Exhaust system, automotive, 109

F

- Failure analysis, galvanized steel products, 414
 Ferrite, granular, in HSLA-100, 199
 Forming problems, galvanized steels, 414
 Ford Model T, 109
 Fractal dimension, fracture surface, 295
 Fracture surfaces, fractal dimension, 295

G

- Galvanneal coatings, quantitative image analysis, 254
 Glass, in automotive materials, 109
 Glass beads, for electrorheological fluid model, 372
 Grain boundaries, twin band identification, 243
 Grain size
 E4 subcommittee, 6
 measurement, 254
 mechanically alloyed aluminum, 344
 Granular bainite, in HSLA-100, 199
 Granular ferrite, in HSLA-100, 199
 Grinding
 diamond disks for, 139
 for ultrathin sectioning, 155

H

- Heat-affected zone
 cast titanium in incompatible investment mold, 429
 HSLA-100, 199
 laser-welded nickel-aluminum bronze, 327
 Heyn intercept method, 254
 High-pressure inert gas atomization, Cu-Nb powders, 363
 History
 electron microscopy, 224
 metallography, E4 committee and, 3, 83
 microanalysis, 224
 microstructure analysis, 313
 phase transformation in iron-carbon alloys, 167
 Hot-dip galvannealed coatings, quantitative image analysis, 254
 Hot isotactic pressing, Nb-2Y composite, 189
 HSLA-100, TEM, 199
 Hydrogen blisters, galvanized steels, 414

I

- Image analysis, 88
 corrosion-resistant coatings, 254
 microscopes, 88
 quantitative, 254
 twin band identification, 243
 Image processing, twin band identification, 243
 Inclusions, subcommittee, 6

Interface reactions, cast titanium in silica-containing mold, 429
 Interface stability, transparent model alloy system for, 393
 Intergranular precipitation, galvanized steels, 414
 Internal cracking, AL 9021, 344
 Investment casting, commercially pure titanium, 429
 Investment molds, silica-containing, 429
 Ion milling, liquid nitrogen, 212
 Iron-carbon alloys, Widmanstatten structure and martensite, 167
 Iron-zinc couples, interdiffusion regions, TEM, 212

J

Jeffries planimetric method, 254
 Joint Committee on Powder Diffraction Standards, 184

L

Laboratory evaluation and safety, E4 subcommittee, 6
 Lapping plates, abrasives on, 313
 Laser-welded nickel-aluminum bronze, microstructure, 327
 Light microscopes, 88
 Light microscopy
 HSLA-100, 199
 laser-welded nickel-aluminum bronze, 327
 quantitative and stereological methods, 235
 Local orientation measurement, 88

M

Macrophotography, laser-welded nickel-aluminum bronze, 327
 Manufacturing, of electron beam instruments, 167
 Martensite, formation and morphology, 167
 Materials analysis
 automotive components, 109
 ultrathin section techniques, 155
 Mechanical alloys, high magnification metallography, 344
 Mercury quench method, 167
 Metallographic techniques
 for AL 9021, 344
 automotive, 109

electron microscopy, early development, 224
 failure analysis, galvanized steels, 414
 fracture surface fractal dimension measurement, 295
 high-pressure inert gas atomization, 363
 for laser-welded nickel-aluminum bronze, 327
 mercury quench method, 167
 microanalysis, early development, 224
 microstructural analysis (*see*
 Microstructure)
 quantitative metallography, 235
 for solidified microstructures, 393
 stereological methods, 235
 for surface preparation, 139
 transmission electron microscopy
 Fe-Zn couples, 212
 HSLA-100, 199
 twin band identification, 243
 ultrathin sections, 155
 X-ray absorption, 177
 X-ray fluorescence, 177
 X-ray methods, 184
 X-ray spectrometry, 177
 Metallographic terminology and nomenclature of Phase Diagrams, E4 subcommittee on, 6
 Metallography
 history, 3, 83
 quantitative (*see* Quantitative metallography)
 Metal matrix composites, Nb-2Y, TEM, 189
 Metal oxide slags, 429
 Microanalysis
 early development, 224
 with electron beams, 167
 Micrographs, stereo, 88
 Micronindentation Hardness Testing, E4 subcommittee, 6
 Microprobes, electron, 88
 Microscopes
 analytical transmission, 177
 light, 88
 resolution, 88
 scanning electron, 88, 177
 scanning tunnel, 88
 transmission electron, 88
 transmission electron, 88
 Microscopy, ultrathin sectioning technique, 155
 Microstructure
 advanced materials, 313
 AL 9021, 344

Microstructure—continued

- analysis, history, 313
 - automotive materials, 109
 - cast titanium in silica-containing investment mold, 429
 - Cu-Nb powders, 363
 - electron microscopy, history, 224
 - electrorheological fluids, 372
 - Fe-Zn couples, 212
 - fracture surface fractal dimension, 295
 - galvanized steels, 414
 - grain size measurement, 254
 - HSLA-100, 199
 - laser-welded nickel-aluminum bronze, 327
 - microanalysis, early development, 224
 - microscopes and imaging devices, 88
 - Nb-2Y, 189
 - necklace, 189
 - scanning electron beam instruments, 167
 - solidified, metallographic techniques, 393
 - twin band identification, 243
 - ultrathin section techniques, 155
 - X-ray methods, 184
- Microsuperplasticity**, AL 9021, 344
- Mixed-phase specimens**, surface preparation, 139
- Montectic systems**, development, transparent model alloy system, 393

N

- Necklace microstructure, 189
- Nickel-aluminum bronze**, laser-welded, microstructure, 327
- Niobium-yttria composites**, TEM, 189
- Nomenclature**, ASTM Committee E4 role, 6, 83

O

- Optical microscopy**
 - electrorheological fluids, structure, 372
 - HSLA-100, 199
- Oxide dispersion strengthening**, Nb-2Y composites, 189
- Oxygen evolution**, AL 9021, 344

P

- Phase identification in metal alloys**, E4 subcommittee, 6

Phase transformations

- martensite, 167
- Widmanstatten structures, 167
- Phosphate-bonded molds**, 429
- Photography**, E4 subcommittee, 6
- Polishing**
 - advanced materials, 313
 - of specimens, 139
 - ultrathin sectioning technique, 155
- Powder Diffraction File**, 184
- Powder metallurgy**, Cu-Nb alloy, 363
- Product specifications**, quantitative and stereological methods, 235
- Profilometry**, fractal dimension measurement, 295
- Publications**, Committee E4, 33

Q

- Quantitative analysis**, techniques development, 167
- Quantitative fractography**, 295
- Quantitative image analysis**, corrosion-resistant coatings, 254
- Quantitative metallography**
 - grain size measurement, 266
 - in standards and specifications, 235
 - subcommittee, 6
- Quartz**, reaction with titanium, 429

R

- Radiators**, automotive, 109
- Rapid solidification**, Cu-Nb powders, 363
- Recommended Practice for Dilatometric Analysis**, E4 subcommittee, 6
- Recrystallization**, Nb-2Y composites, 189
- Resolution**, of microscopes, 88
- Rubber**, in automotive materials, 109

S

- Sample selection and preparation**, E4 subcommittee on, 6
- Scanning**, in microscopy, 88
- Scanning electron microscopes**, 88, 177
- Scanning electron microscopy**
 - cast titanium in silica-containing investment mold, 429
 - Cu-Nb powders, 363
 - HSLA-100, 199
 - laser-welded nickel-aluminum bronze, 327
 - mechanically alloyed aluminum, 344
- Scanning tunnel microscopes**, 88

Selected area diffraction
Fe-Zn couples, 212

Selected area diffraction
history, 184

Shear ridges, AL 9021, 344

Silica, vitreous, interfacial, 429

Silica-containing investment molds, for
commercially pure titanium, 429

Size, grain, 254

Slit-island analysis, fractal dimension
measurement, 295

Solidification, transparent materials for,
393

Special Committee on Grain
Characteristics, 6

Specifications, product (*see* Product
specifications)

Specimens
early studies of Widmanstatten and
martensite, 167

surface preparation, 139

X-ray methods, 184

Sprayed coatings, microstructure analysis,
313

Standards (*see* ASTM standards)

Statistical analyses
electrorheological fluid structure, 372

grain size measurement, 254

Steels
in automotive materials, 109

galvanized, failure analysis, 414

low-carbon, TEM, 199

Stereological methods, in standards and
specifications, 235

Stereo micrographs, 88

Surface relief, Widmanstatten structures
and martensite, 167

Surfaces, fracture, fractal dimension, 295

T

Telescopes, cloud-piercing, 88

Thermal analysis, E4 subcommittee on, 6

Thermal spray coatings, quantitative
image analysis, 254

Titanium, cast, reaction with silica-
containing investment mold, 429

Transmission electron microscopes, 88,
177

Transmission electron microscopy
early development, 224

Fe-Zn couples, 212

HSLA-100, 199

laser-welded nickel-aluminum bronze,
327

niobium-yttria composites, 189

Transmissions, automotive, 109

Transparent materials, for solidification
phenomena, 393

Triple-point count method, 254

Twin bands, identification with AI, 243

U

Undercutting, of specimens, 139

V

Valvetrain, automotive, 109

Vitreous silica, interfacial, 429

W

Weld zone, in laser-welded nickel-
aluminum bronze, 327

Widmanstatten structures, formation and
morphology, 167

Windshields, automotive, 109

Wood, in automotive materials, 109

X

X-ray absorption, 177

X-Ray Crystal Analysis, E4
subcommittee, 6

X-ray diffraction, methods history, 184

X-ray fluorescence, 177

X-ray microanalyzers, 167

X-ray spectrometry, development, 177

Z

ZAF method, 167

Zeta phase, Fe-Zn couples, 212