Index

2D cross-section, 6, 63, 94
3D microstructure, 6, 63, 69, 85, 88, 94, 95, 99–101, 166, 167
3D realization process, 70

**A, C, D**
anisotropic, 6, 11, 43, 44, 63, 78, 94, 101–106, 113, 116, 120, 130
annealing technique, 10, 43, 68
anode microstructure, 39, 40, 70, 81–84, 88
autocorrelation, 20–23, 68, 92–94
approximate solution, 43
Cayley–Menger determinant, 58, 60
characterization of microstructure, 24, 43, 44, 133, 152
cohesive zone model, 150, 152–156, 160, 167
colony algorithm, 2, 45, 47, 66, 94
correlation vectors, 20, 58, 92
debonding induced damage, 149–165

debonding induced damage, 149–165

**E, F, G**
Eden fractal model, 69
effective conductivity, 44, 115, 116, 120, 122
properties, 1, 11–13, 19, 96, 103, 105, 129, 130, 133
stiffness tensor, 12, 104, 105, 108, 112, 122, 123, 130, 134
eigen microstructure, 19–21, 91, 92, 96
FIB/SEM, 4, 6–8
FFT, 20, 92, 93
finite element homogenization, 134–141
GNP/polyethylene composite, 152
grain growth, 69, 70, 79, 141
Green’s function solution, 106, 107, 113

**H, I, L**
Heron’s formula, 59
high density polyethylene, 157
homogenization methods, 11, 12, 103
in situ tensile tests, 149
interfacial debonding, 149
lineal-path function, 4, 68

M, N, O
Monte Carlo calculation, 17–19, 98, 99
morphology, 1, 12, 15, 16, 42, 45, 69, 134
multiphase materials, 1, 68
n-point correlation functions, 43
nanoclay, 103
  based polymer, 103, 131
  nanocomposites, 103
nanocomposites, 103
Neumann neighborhood, 77, 78
objective function, 70–72, 76, 79, 142
orientation distribution, 43, 69

P, R, S
percolation analysis, 79
perfectly bonded, 158–162, 167
phase recovery, 68, 91–95, 101
polarization field, 106, 113–115
porous phase, 39, 40, 85, 87
random heterogeneous material, 1, 2, 112
reconstructed RVE, 133
reconstruction, 4
representative volume element, 13, 60, 96, 99, 136, 150–152
serial sectioning, 6, 8, 95, 134–137
shrinkage, 71, 73, 74, 79
slope condition, 29, 34–36
small-angle neutron scattering, 15
small-angle X-ray scattering, 15, 16, 21, 25–28
solid oxide fuel cell, 39, 40, 44, 70, 81, 82
spectral analysis, 29, 30, 38
statistical
  correlation functions, 103
  isotropy, 23
strong-contrast approach, 12, 104–112, 127, 133
structural characterization, 24–28
symmetrized double gradient tensor, 107, 123

T, U
thermo-mechanical properties, 128–130, 134, 167
three-point correlation functions, 17, 45–52, 58, 60–62, 65, 104, 115, 117, 118, 125, 131
traction-separation response, 152, 156
triangular inequality, 29, 34, 37
two-point
  cluster functions, 4, 141–143, 145, 166
  probability functions, 2, 3, 28, 44, 68
unidirectional glass fibers, 6, 62, 63

V, W, X
volume fraction and aspect ratio, 150, 151, 158–162
weak bonding, 163–165, 167
weight functions, 49, 51, 53, 55, 56, 58, 60, 61, 66
X-ray computed tomography, 4–6