Index

A
absorption coefficiency, 86
anisotropic materials, 7
aperture arrays, 121
atomic layer deposition (ALD), 216
attenuated total reflection (ATR), 63
attenuation factor, 14

B
bottom-up synthesis, 207
boundary conditions, 77
Bruggeman medium theory (BMT), 38
bulk refractive index, 92

C
channel plasmon polariton (CPP), 157
charge density, 3
chemical vapor deposition (CVD), 216
composite nanostructure, 33
conduction electron, 15
constitutive equations, 4, 7
continuity equation, 3
continuous boundary conditions, 46
corrugated grating excitation, 65
coupling models, 179
coupling tensors, 7
current density, 3
cutoff wavelength, 112, 113
cylindrical surface plasmon (CSP), 135

depolarization factors, 95
dielectric fibers, 142
dielectric media, 7
directivity efficiency, 176
dispersion curve, 54
dispersion relation, 44
Drude–Lorentz model, 17, 24–26
Drude model, 21, 23

effective index method (EIM), 148
effective medium theory (EMT), 34
effective refractive index, 92, 93
electromagnetic induced transparency (EIT), 187
electromagnetic wave theory, 2, 9
electron energy loss spectroscopy (EELS), 235
electron-beam lithography (EBL), 209
end-fire coupling, 68
evanescent waves, 61
extinction coefficient, 89
extinction spectra, 84
extraordinary optical transmission (EOT), 106

F
Fano resonance, 113
far field, 170
Fermi velocity, 19
figure of merit (FoM), 160
finite difference time domain (FDTD), 115, 185, 195
fluorescence emission, 98
focused ion beam (FIB), 211
Fourier transform infrared nanospectroscopy (NanoFTIR), 232
Fourier transform infrared spectroscopy (FTIR), 195, 232
full width at half maximum (FWHM), 90

G
Gauss’ laws, 2
Green’s function, 172

H
harmonic oscillator, 17
He-ion lithography (HIL), 213
hole arrays, 134
hydrogensil sesquiox-ane (HSQ), 209

I
insulator-metal-insulator (IMI), 142, 144, 145
interband transition, 15, 16
ion-beam etching (IBE), 214
ion-beam lithography (IBL), 211
isotropic medium, 6

K
Kramers–Kronig formula, 30

L
lift-off process, 209, 210
light-mediated synthesis, 227
local density of states (LDOS), 172
local field, 35
localized surface plasmon resonance (LSPR), 43, 73
Lorentz cavity model, 34
Lorentz model, 23
Lorentzian function, 176
loss tangent, 11

M
Maxwell–Garnett geometry, 34, 36
Maxwell–Garnett theory (MGT), 37
Maxwell’s equations, 45
mean free path, 89
metal-insulator-metal (MIM), 142, 144, 145, 153, 154
metallic nanowires, 142
metallic stripe, 162
Mie scattering theory, 83
momentum mismatch, 53

N
nanoimprint lithography (NIL), 219
nanosphere lithography (NSL), 217
near field, 170
near-field enhancement, 110
near-field excitation, 66
nonspherical nanoparticles, 94

O
optical antenna, 168
Otto geometry, 65

P
penetration depth, 12, 55, 59
permeability, 9, 10
permittivity, 9, 10
photoemission electron microscope (PEEM), 234
plasma frequency, 19
plasmonic waveguides, 142, 143
polymethyl methacrylate (PMMA), 209
polyol synthesis process, 222
power confinement factor, 161
Poynting’s theory, 172
prism-coupling approach, 63
propagation constant, 119
propagation length, 55, 58
Purcell effect, 176
Purcell factor, 177

Q
quantum efficiency, 91, 175
quasi-static approximation, 76

R
radiation efficiency, 175, 181
reactive ion etching (RIE), 210
reciprocity theorem, 173, 174
reflection coefficient, 27
refractive index, 10
resonance conditions, 74

S
scanning near-field optical microscope (SNOM), 67
scattering efficiency, 83
scattering field distribution, 78
seed-mediated growth, 224
skin depth, 12, 13, 74
slit aperture, 129
spectrum shifting, 91
spherical nanoparticle, 180
spontaneous emission, 171, 176
surface plasmon polaritons (SPPs), 1, 43, 44
surface plasmon wavelength, 55, 56
susceptibilities, 6

T
thermal nanoimprint lithography (TNIL), 219
tip-enhanced Raman scattering (TERS), 199
tip scanning probe, 230
top-down removal, 208
total dissipation power, 183
transition efficiency, 176, 184
transmission coefficient, 108
transmission spectra, 122, 123, 132
transmitted intensity, 108
transverse electric (TE) polarization, 146
transverse magnetic (TM) polarization, 146
two-photon induced luminescence (TPL), 185

U
ultraviolet-based nanoimprint lithography (UV-NIL), 219

W
wedge plasmon polariton (WPP), 159

Y
Yagi–Uda antenna, 189
Yongqian Li is currently a Professor at Northwestern Polytechnical University (NWPU), Xi’an, China, working as a principal researcher at the MicroNano System Lab. He received his B.S. and Ph.D. in Mechanical Engineering from NWPU in 1998 and 2003, respectively, and then completed his postdoctoral research at the Micro System Lab of the Dalian University of Technology (DLUT) in 2005. He had been a visiting scholar at the University of California, Berkeley, USA for one year. His research interests focus on light–matter interactions, involving plasmonic optics, metamaterials, and metasurfaces.