

Index

A

Acid/base sensing 92
Active sensing 89
Affinity constants 50
Aflatoxins 14, 15
Alkyl amine 94
3-Aminopropyltriethoxysilane (APTES) 219
Ammonia in air 93
Amplified spontaneous emission (ASE) 120
Antibodies 9
Antibody–antigen 12, 49, 146
Antibody-based immunoassays 11
Aptamers 9
Array sensing 12
AuNPs, optical fibers, LSPR 223
 photonic crystal optical fibers 225
 photonic crystal waveguides 220
 planar waveguides, LSPR 214
AWACSS platform 8
Azobenzene 97

B

Bacteria, identification 14
Bioaffinity-based immobilization 10
Biomolecular interactions 181
Biosensors 156, 181
 LSPR 184
Biotin–avidin 10
Biotin–NeutrAvidin interactions 148
 β -Blocker 220
Broadband spectroscopy 126

C

Calmodulin (CaM)-binding protein 144
Calspermin 144
Campylobacter jejuni 14, 15
Cancer biomarkers 49
Carbohydrate microarrays, SPRi 147
Carbohydrate-binding proteins (CBPs) 143
Carbohydrate–protein (semi-selective) interactions 12
Carbohydrates 9
Cell membrane receptor–ligand 49
Chemical sensing 156
 passive/active 78
Chlorine, surface water 94
Cholera toxin (CT)/monosialotetrahexosylganglioside (GM1) 145
Citric acid 92
Colorimetric resonant reflection 40
Couplers, achromatic 119
Cytochrome c films, spectroelectrochemistry 124

D

Detection systems, grating-based label-free 37
Dichroic adlayer 108
Diphtheria toxin 14
DNA, single-stranded 58
DNA/RNA 9
DNA aptamer–human Immunoglobulin E (IgE) 145

DNA hybridization assays 11
Dyes, adsorbed 122

E

EA-IOW 120, 123, 126
Effective medium 181
Eigenmodes (modes) 26
Electromagnetic approach 28
Enzyme-linked immunosorbant assay (ELISA) 5
Enzyme–substrate 49
Epoxy 97
Evanescent field 23, 137
 fluorescence 43
Evanescent resonator (ER)
 chips 6, 8
Extraordinary optical transmission (EOT) 156, 165

F

Fab fragments 10
Figures of merit 188
Focused ion beam (FIB) milling 165
Freons 85
Front-face coupling 35

G

Gangliosides 11
Glycosaminoglycan (GAG) 148
Gold layers, thin 209
Gold nanoparticle devices 210, 213
Grating couplers 37, 117
Grating coupling 9, 35, 70

H

Hepatitis B 14
Hexaethylene glycol spacer (HEG) 141
Hexamethyldisilazane (HMDS) 90
High-mobility-group transcriptional factor (HMGA2) 144
HPLC-SPR 149

I

IgG subclasses 14
Imaging ellipsometry (IE) 146

Immunoglobulin E (IgE) 145
Indium tin oxide (ITO) 6
Input grating coupler 38
Integrated optical waveguides (IOW) 6, 10
Interferometers, ARROW 73
 channel 73
 ion-exchange 73
 Mach-Zehnder (MZI) 41, 72, 214
 massless response 96
 multi- 76
 polarimetric 75
 ribbed 73
 two-mode 75
 types 42, 72
 Young's 43, 73, 74
Interleukins 14
Internal reflection elements (IRE) 6

L

Lasers 119
LC-SPR-MS 148
Lectins, carbohydrate-immobilized surfaces 142
Ligand–receptor 49
Light coupling 34, 69
Light sources, broadband 119
LiNbO₃ waveguide 219
Lipid transfer proteins (LTPs) 144
Localized surface plasmon resonance (LSPR) 181, 183, 214
 biosensors 184
 particle plasmon/LSP excited by surface relief nanostructures 193
 surface relief nanostructures 185
Low-pressure chemical vapor deposition (LPCVD) 36

M

Mach-Zehnder interferometer (MZI) 41, 72, 214
Magnetron-sputtering 36
N- γ -Maleimidobutyryloxy-succinimide ester (GMBS) 10
Mannosylerythritol lipid (MEL) 144
Mercaptopropionic acid (MPA) 218
Mercaptoundecanoic acid (MUA) 167

Metal-enhanced fluorescence (MEF) 7
Metal–insulator–metal (MIM) gap 162
Metals, nanostructured 163
 optical sensing 157
Methylene blue (MB) 120
Microfluidics 156
Molecular orientation 114
Multiinterferometer devices 55

N

Nanofluidics 156
Nanohole arrays 156, 164, 168
Nanohole sensors, integration 172
Nanoparticles 181
Nanostructures 181
Nickel-nitriloacetic acid (Ni-NTA) 10
Niobium oxide 36
Nitrides 35
NRL array biosensor 8
Nucleic acids 9

O

Optical absorbance 102
Optical fibers 209
Optical sensing 156
Optical waveguides (OW) 6, 209
Output grating coupler 39

P

Passive sensing 80
PDMS flow cells 13
Peptides 9
Photonic crystals 209
 optical fibers 225
Photopatterning/photolithography 12
Plasma-enhanced chemical vapor
 deposition (PECVD) 36
Platform design 7
Polarized measurements 114
Poly (2,6-dimethyl phenylene-p-oxide) 88
Poly-histidine-tag (Poly-His) 10
Prism couplers 116
Prism coupling 9, 35, 70
Protein microarrays 49
Protein–carbohydrate interactions 140,
 143, 147

Protein–DNA/RNA 49, 143
Protein–lipid interactions 144
Protein–protein/peptide 49, 143
Protein–surface (nonspecific)
 interactions 12

R

Ray-optics approach 25
Receptors 9
Reflection mode grating coupler 39
Refractive index, change 181
 effective 27
Resonance condition, geometrical
 representation 26
Resonant waveguide grating (RWG)
 biosensor 48
Retinol-binding protein 4 (RBP4) 143
Rhodamine B 225
RNA aptamer/protein biomarker/
 antibody-HRP 147

S

Sambucus nigra agglutinin (SNA) 141
Sandwich immunoassays 11
Schistosoma mansoni, glycan
 repertoire 143
SEB 14
SELEX (systematic evolution of ligands by
 exponential enrichment) 143
Sensitivity 181
Sensitivity enhancement factor (SEF) 188
Sensorgrams, kinetics 138
Sialosides, biotinylated 142
Silicon oxynitride (SiON_x) 6, 36
Silicon wafer stencils 13
Single-layer waveguides 104
Sol-gel encapsulation 10
Soluble green fluorescent protein
 (smGFP) 144
Spectroelectrochemistry 102
SPFS 149
SPR (surface plasmon resonance) 136, 140,
 148, 157, 160, 181
 biointeraction analysis 140
 HPLC-SPR 149
 hyphenated 148
 kinetics 136

LC-SPR-MS 148
 sensing, nanoholes 167
 SPR-fluorescence (SPFS) 148
 SPR imaging (SPRi) 140
 carbohydrate microarrays 147
 microarray technology 145
 protein–DNA/aptamer interactions 145
 protein–protein interactions 145
 signal amplification 146
 SPR-MS 148
 Staphylococcal enterotoxin
 (anti-SEB) 225
 Surface plasmon polaritons 157
 Surface plasmon waveguide coupling 211
 optical fibers 212
 Surface plasmons, nanostructured
 metals 161
 Surface-enhanced fluorescence 164
 Surface-enhanced Raman scattering
 (SERS) 163
 Surface-enhanced resonance Raman
 scattering (SERRS) 168

T

Tantalum pentoxide (Ta_2O_5) 6
 Tetanus toxin 14
 Tethered bilayer membrane (tBLM) 145
 Thermal response 96
 Thin films 181
 Tin oxide 6
 TIR, principles 5
 TIRF-microscopy (TIRFM) 7
 Titanium oxide 36
 TNT, molecular imprinting strategy 94, 95
 Total internal reflection fluorescence (TIRF)
 3, 4, 11
 multiplexing 12
 Triacetone triperoxide (TATP) 97

Trifluorobromomethane 85
 Trifluoroiodomethane 85

V

Vascular endothelial growth factor
 (VEGF) 147
 Vertical cavity surface-emitting laser diode
 (VCSEL) 39

W

Waveguides 6
 ARROW 69
 channel 69
 couplers 116
 electro-active optical (EA-IOW) 120, 123
 fabrication 34
 high-refractive-index optical 23, 36
 integrated optical (IOW) 102
 ion-exchange 69, 121
 light ray propagation 61
 materials 35
 multilayer integrated optical 109
 multimode 24
 optical (OW) 6, 209
 planar 12, 59, 211
 profiles, graded/step-index 65
 ribbed 69
 sensitivities 66
 single-layer 104
 single-mode 24
 surfaces, patterning 13
 theory 24
 Wavelength interrogated optical sensor
 (WIOS) 39, 47

Y

Young's interferometer 44, 73, 74