

## Index

- accurate mass measurement 115  
acetone, shake-up structure 75  
acid etching 5  
acid–base interaction 5, 184  
additive 2, 119, 149, 168  
adhesion 1, 6, 157, 174  
adhesive 1  
adiabatic approximation 61  
AES 21, 23, 97  
AFM 6, 8, 86, 175  
angle-resolved XPS 36, 85, 157, 179  
angular asymmetry factor 41, 42  
anode materials (*see* X-ray source)  
antimicrobial 3  
antioxidant 3, 4, 168  
antistatic agent 3, 4  
atom source 91  
attenuation length, electron 35, 36, 85  
Auger process 31, 33  
Auger series 7, 29, 32, 82  
autoadhesion (*see* heat sealability)  
automotive moulding, formulation of 3
- background  
algorithms (XPS) 40  
subtraction (XPS) 27, 40, 58
- band gap 32
- band structure calculation 82
- beam damage (*see* radiation damage)
- Beer–Lambert law 34
- benzene, shake-up structure 74
- Bethe equation 37
- binding energy  
electron 7  
referencing 47, 48
- biocompatibility 2, 6, 164
- biomedical polyurethane 162
- Biomer 167
- blocking 1
- blood bag 1
- Bragg equation 20
- bremsstahlung radiation 17, 20, 21, 29, 49
- catalyst 2
- catheter 2
- cationisation 119  
alkali ion 104, 147, 153  
silver ion 104, 151, 176
- CCD camera 24
- cellulose 52
- cellulose trinitrate 52
- chain extender 163, 166
- channel electron multiplier (channeltron) 23, 95
- channel plate detector 24, 95
- charge  
neutralisation 48, 53, 79, 97, 112  
potential model 61  
storage capacity 1
- chemical reactivity 1
- chemical shift (*see also* core level) 10, 53, 60, 156  
carbon–halogen 62, 70  
carbon–oxygen 64  
carbon–nitrogen 64
- chemometrics 144
- chlorinated polypropylene 63
- cling 157
- cluster ion 101
- collision cascade 100
- colloidal polymer 142
- colourant 3
- composite 2
- compounding 2

- concentric hemispherical analyser (CHA) 21, 26
- conducting polymer 1, 184
- conduction band 32
- constant analyser energy (CAE) mode 23, 44
- constant retard ratio (CRR) mode 23
- contact angle 171
- contact lens 2
- contaminant 2, 4, 119, 144
- copolymer 2, 140, 144
- core level 10, 29, 52
  - width 30
  - lineshape 53, 60
  - vibrational fine structure 55
- corona discharge (*see* electrical discharge treatment)
- Coster–Kronig process 33
- coupling agent 3
- crazing 1
- critical surface tension 5
- cross-linking 2, 5, 144, 184
- crystallinity, degree of 2, 158
- curve-fitting 27, 58, 63, 67, 157
- cylindrical mirror analyser (CMA) 21
- datasystem 14, 27, 88, 97
- deconvolution 27, 58
- defluorination 5
- degradation index (*see* X-ray)
- depth distribution function 35
- depth profiling 11, 27, 85, 97, 179
- depth scale, surface properties 5
- derivatisation 83, 172
- detector XPS 23 SIMS 95
- deuterium exchange 146
- di-isonyl phthalate 150
- di-isopropylaminoethyl methacrylate 169
- di-octyl phthalate 148
- di-octyl sulphosuccinate 149
- differential charging 48
- dispersant 4
- domains, polymer blends 2, 164
- Doniach–Sunjic theory 53
- doping (*see* conducting polymer)
- double anode (*see* X-ray source)
- drug release vehicle 1
- dynamic SIMS 11, 101, 102
- E*–*X* imaging 26, 181
- EELS 8
- elastic electron scattering 35, 86
- electrical discharge treatment 5, 170
- electrical properties, polymers 1
- electroactive polymer (*see* conducting polymer)
- electron energy analyser 14, 21
- electron flood gun 47, 112
- electron retardation 23
- electron scattering 34
- electron stimulated desorption (ESD) 112, 114
- electron stimulated ion emission (ESIE) 112, 114
- electronic sputtering 102
- element, detection of XPS 30, 156 SIMS 119, 156
- ellipsometry 8, 36
- EMA polymers, surface structure 157
- end-groups, polymer 2, 142, 146, 152, 165
- energy compensation, ToFSIMS 94
- energy filter, SIMS 92, 112
- energy resolution 10, 53, 58
  - absolute 21
  - relative 21
  - resolving power 21
- epoxy resin 1
- equivalent cores approximation 58
- erucamide 148
- ESCA 10
- escape depth, electrons 36, 48
- etendue, electron spectrometer 41, 43
- ethylene bis-stearamide 148
- extra-atomic relaxation 62
- factor analysis 27
- Fermi level 31, 32, 48
- fibre 1, 4
- filler 3, 4
- film 1, 4, 157, 170
- final state effect, XPS 61, 69
- final state configuration interaction calculation 75
- finish, fibre 4
- flame retardant 3
- flame treatment 5
- foaming agent 3
- fragmentation, SSIMS (*see* secondary ion formation)
- Franck–Condon principle 55, 58
- friction 1, 6
- functional group labelling (*see* derivatisation)
- functionalisation, polymer 5
- Gauss–Lorentzian ratio 53, 55, 60
- GIXRD 8
- gloss 1
- glyceryl monostearate 148
- grease 1
- H-bonding 5, 171
- hard segment (*see* poly(urethane))
- haze 1
- He scattering 8
- heat sealability 1, 5, 157, 171
- heat stabiliser 3, 4
- hexatriacontane 49, 55
- high mass resolution 94, 117, 119, 129, 160, 175
- hydraulic fluid 1
- hydrocarbon contamination 45, 49
- hydrocarbon polymers 55, 65, 78, 121
- imaging in
  - SIMS 12, 96, 111, 179
  - XPS 24, 181
- inductive effect 63
- inelastic mean free path, electron 35, 36, 41
- inelastic scattering, electron 34, 74
- infrared spectroscopy 7, 8, 167, 171
- initial state effect, XPS 61, 69
- instrumentation 16, 88, 156
- intra-atomic relaxation 61
- ion scattering spectroscopy 8

- ion source 89
  - Cs 90
  - electron impact 89, 91
    - Ga 91
    - In 91
  - liquid metal 90, 96, 112
    - noble gas (Ar, Xe) 89, 91
  - pulsed 89, 90
  - surface ionisation 90
- ionisation, SSIMS 102
- Irgafos 168
- Irganox 1010 149
- Irganox 245 168
- isotope, detection of 11, 120, 138, 146
- kinetic energy,
  - Auger electron 33
  - photoelectron 7, 10
  - secondary ion 92, 93
- lamination 170
- Langmuir–Blodgett film 36
- lateral resolution (*see* spatial resolution)
- latex polymer 142
- LEED 8
- liquid crystal display 1
- lubricant 3, 4
- lubricity 1
- Madelung potential 61
- mass calibration, ToFSIMS 115
- mass resolution
  - quadrupole mass spectrometer 92
  - ToF mass spectrometer 94, 119
- matrix effect 102, 149
- methane, vibrational fine structure 55
- microanalysis 11, 27, 96, 183
- microchannel plate (*see* channel plate)
- microprobe, imaging approach
  - SSIMS 96, 100
  - XPS 25
- migration, additives 4, 84
- molecular orbital calculation 81, 82, 189
- molecular weight distribution 2, 144, 152
- monochromator (*see* X-ray monochromation)
- mould release agent 3
- moulding 1, 3
- mu-metal 14
- multidetector, XPS 24
- neutron reflectometry 8, 179
- NEXAFS 8
- nomenclature
  - Auger series 33
  - core level 29
- nonyl phenol ethoxylate 148
- nylon-6 81, 135
- odd-electron ions 147
- offsetting, from film 4
- oleamide 148
- oligomer 2, 98, 152
- optical fibre coating 1
- optical properties, polymer 1
- organic mass spectrometry 11, 104, 116
  - chemical ionisation 104, 147
  - electron impact 104, 147
  - field desorption 104
- oxidation, polymer 5, 157, 171
- packaging 5
- paint 1
- palmitic acid 148
- pass energy, electron energy analyser 23
- perfluoropolyether 142
- permeability 1
- peroxide 3
- photoelectric effect 7, 27
- photoemission
  - cross-section 30, 41, 45, 52
  - elastic 29, 34
  - inelastic 29, 34
  - process 27
- pigment 3, 4
- plasma deposition 5, 36
- plasma desorption mass spectrometry 102
- plasma treatment 5, 146
- plasticiser 3, 4
- polarisation relaxation 53
- poly(2-ethyl oxazoline) 46
- poly(4-bromostyrene) 46
- poly(4-methyl-pentene-1) 122
- poly(acetylacetoxymethyl methacrylate) 67
- poly(acetylene) 184, 186
- poly(acrylate) 123
- poly(acrylamide) 52
- poly(acrylonitrile) 54
- poly(allylamine) 46
- poly(allylamine hydrochloride) 46
- poly(amide) 135
- poly(aniline) 184, 186
- poly(but-1-ene) 78, 122
- poly(caprolactam) (*see* nylon-6)
- poly(caprolactone) 72
- poly(carbonate) 135, 142
- poly(chloroethyl methacrylate) 51, 52
- poly(chlorostyrene) 51, 78
- poly(cis-butadiene) 52
- poly(dimethyl siloxane) (silicone) 13, 46, 52, 86, 117, 138, 148
- poly(ester) 1, 132
- poly(ether) 132, 163
- poly(ether ether ketone) 52, 66
- poly(ethyl acrylate) 52
- poly(ethyl acrylate) 132
- poly(ethyl methacrylate-co-hydroxyethyl methacrylate) 140
- poly(ethylene) 5, 48, 55, 78, 122, 170
- poly(ethylene glycol) 52, 132, 142, 146, 148, 153
- poly(ethylene sulphide) 46, 49
- poly(ethylene terephthalate) (PET) 13, 55, 58, 98, 107, 112, 132
- poly(ethylene-co-chlorotrifluoroethylene) 46, 48
- poly(ethylene-co-methylacrylate) 157
- poly(imide) 66, 78
- poly(isobutylene) 121, 122

- poly(isoprene) 66
- poly(ketone) 78
- poly(lauryl methacrylate) 55
- poly(methacrylate) 123
- poly(methacrylonitrile) 46
- poly(methyl acrylate) 59, 72
- poly(methyl methacrylate) (PMMA) 36, 38, 39, 52, 75, 109, 110, 125, 128, 130, 142
- poly(methyl methacrylate-co-PEG methacrylate) 153
- poly(n-butyl methacrylate) 142
- poly(phenylene) 184
- poly(phenylene sulphide) 184
- poly(phenylene vinylene) 184
- poly(phosphazene) 28, 70
- poly(propylene) 3, 52, 55, 78, 121, 122, 170, 174
- poly(propylene glycol) 46, 148, 164
- poly(pyrole) 184
- poly(siloxane) 58
- poly(styrene) 12, 52, 55, 65, 74, 119, 121, 123, 125, 146, 150
- poly(sulphone) 78
- poly(tetrafluoroethylene) (PTFE) 5, 10, 13, 46, 48, 52, 138
- poly(thiophene) 184, 187
- poly(trifluoroethyl acrylate) 82
- poly(urethane) 72, 117, 135, 140, 162
- poly(vinyl acetate) 59, 72
- poly(vinyl carboxylate) 123
- poly(vinyl chloride) (PVC) 46, 49, 51, 52, 117, 138
- poly(vinyl ether) 123
- poly(vinyl ethyl ether) 126, 127
- poly(vinyl ethyl ketone) 126, 127
- poly(vinyl ketone) 123
- poly(vinyl methyl ether) 46
- poly(vinyl methyl ketone) 75, 78, 83
- poly(vinyl propionate) 126, 127
- poly(vinylidene chloride) 51
- poly(vinylidene fluoride) 138
- polycyclic aromatic ions 121, 124
- polymer fragment ions 123
  - halogen-containing 138
  - main-chain-oxygen-containing 132
  - nitrogen-containing 135
  - side-chain oxygen functions 123
  - silicones 138
- polymerisation 4
- Poschenreider mass analyser 94
- position sensitive detector 24, 26, 97
- primary substituent effect, chemical shift 62
- printability 1, 157, 170, 174
- printing ink 1, 5, 174
- processing, polymer 2, 4
- prompt collisional sputtering 100
- pump oil 4
- quadrupole mass analyser 11, 89, 91, 106
- quantification
  - SSIMS 139, 160, 165
  - XPS 27, 39, 78, 157, 166, 173
  - XPS/SSIMS correlation 139, 162
- quartz crystal monochromator 20
- radiation damage in
  - SSIMS 11, 91, 108, 147
  - XPS 47, 49, 53, 79
- Raman spectroscopy 8
- RBS 8
- reflectron mass analyser 94
- relative atomic sensitivity factor 44, 46
- relaxation effect, core level 55, 58, 63, 69, 73
- relaxation energy 61
- release agent 4, 13
- releaseability 1
- repellency agent 3
- retrospective image analysis, SSIMS 96, 181
- rotating anode 21
- Rowland circle 20
- rubber 51
- rubber modifier 4
- sample charging (*see also* charge neutralisation)
  - XPS 47
  - SSIMS 112
- sample cooling 17, 147
- sample damage (*see* radiation damage)
- sample handling 16
- sampling depth
  - SSIMS 116, 156, 180
  - XPS 34, 39, 87, 156
- scanning probe microscopy 6
- secondary ion
  - attenuation 117
  - energy distribution 108, 113, 116
  - formation 100, 104, 108
  - fragmentation 102, 152
  - from polymers 104
  - from surface molecules 146
  - yield 93
- secondary substituent effect, chemical shift 93
- self-assembled monolayer 6
- selvedge 103, 147
- SEM 180
- shake-off 61, 73
- shake-up 58, 62, 72, 73
- Shirley background 40, 45
- signal:noise, XPS 21, 53, 85
- silicone (*see* poly(dimethyl siloxane))
- sodium dodecyl sulphate 149
- sodium naphthalenide 5
- soft segment (*see* poly(urethane))
- solvent wipe 5
- solvent, retained 184
- spatial resolution 6, 11, 25, 96, 156
- spherical sector analyser (*see* CHA)
- spherulite 2
- spin-orbit splitting 30, 73
- sputtering 11, 85, 100
  - simulation 101
- SSIMS
  - definition 108
  - history 11
  - instrumentation 88
  - physical basis 100
  - threshold 109

- static SIMS conditions 12, 108  
stearamide 148  
stearic acid 148  
stigmatic imaging 90, 96  
STM 8  
sudden approximation 61, 73  
surface  
    analysis techniques 6  
    behaviour 5  
    contamination 15  
    difference from bulk 2  
    engineering 5  
    grafting 5  
    modification 4  
    pretreatment 4, 170  
    roughness 6, 41, 86  
    segregation 4, 117, 140, 165, 179  
take-off angle, XPS 27, 36, 39, 47, 85, 116  
tandem mass spectrometry 106  
Taylor cone 90  
TEM 2  
thermal sputtering 101  
thermoplastic 2  
thermoset 1, 2  
ToF mass analyser 12, 89, 93  
Tougaard background 40, 45  
transfer lens, XPS 14, 22  
transmission (efficiency)  
    electron spectrometer 44  
    quadrupole mass spectrometer 92  
    ToF mass spectrometer 94  
triboelectric behaviour 1  
TRIFT mass analyser 94, 108  
triphenyl phosphate 148  
UHV 6, 10, 11, 15, 49  
universal curve 37  
useful ion yield 111  
UV stabiliser 3, 4  
vacuum pumps 16  
vacuum system 14, 88  
valence band 17, 29, 31, 78, 189  
vibrational excitation 55  
Viton A 73  
weak boundary layer 174  
wear 1  
wetability 1, 5, 157  
wetting 6  
Wien (mass) filter 89  
work function 7, 29  
X-alpha calculation 82  
XPS  
    equation 7, 29  
    history 7  
    instrumentation 14  
    intensity 41  
    spectrum 27  
    surface sensitivity 8, 34  
X-ray  
    ghost 19, 20  
    satellite 17, 20, 79  
X-ray degradation index 51  
X-ray emission spectrum 17  
X-ray fluorescence 31, 32  
X-ray focussing 21, 48  
X-ray monochromation 20, 24, 55  
X-ray reflectometry 8  
X-ray source 4, 17  
X-ray spectroscopy 7