

Index

- 3,4-dihydroxy-*L*-phenylalanine (DOPA), 213–16, 218, 220
- abdominal movement, 152
- adaptation, biological, 249
- adhesion, 81–82, 86, 95, 101, 114, 213–16, 218–22, 224, 226, 228
- aerodynamic forces, 32–33, 36, 38–39, 43–44
- aerodynamic mechanisms, 32, 42, 61
- aerodynamics, 36–37, 39–40
- AFM, *see* atomic force microscopy
- air motion, 230–33, 235–36, 241–42, 244
 - alternating, 232
 - sinusoidal, 232, 235, 240, 243
 - sinusoidal stimulus, 239
 - stimulus, 229, 232–33
- air velocity, 231, 241–43, 252
- air viscosity, 240
 - kinematic, 240–41
- allometric scaling, 246–49
- amplitude, 36, 39, 44, 58, 86, 88–89, 91–92, 99, 103, 199, 241, 264–65
 - deflection, 237, 239, 242, 253
 - lift fluctuation, 44
 - roll, 43–44
 - undulatory, 50
 - wingbeat, 42
- angle of attack (AoA), 37, 40, 42, 45, 48
- antireflection (AR), 190, 195
- AoA, *see* angle of attack
 - kinematic, 42
 - high, 48
- AR, *see* antireflection
- asymmetric wing folding, 150
- asymmetry, 6–7, 42
 - bilateral, 42–43
 - right-left, 150
- atomic force microscopy (AFM), 17, 19–24, 97
- atom transfer radical polymerization (ATRP), 221
- ATRP, *see* atom transfer radical polymerization
- averaged friction forces, 82, 90–94, 103–4
- basal muscular actions, 143
- Baxter model, 203–4, 207
- BCF, *see* body and caudal fin
- bees, 41–43, 141
- beetles, 40, 141–43, 145–46, 148–49, 176
- biofluid dynamics, 29–32, 61–62
- bioinspired flight, 41, 45, 63
- biological flights, 32, 63
- biological flying, 29–30
- biomaterials, 156–58, 170–71
- biomimetic design (BMD), 1, 5, 8–12, 29, 45, 61
- biomimetics, 29–30, 41, 55, 57, 62–63, 141, 153, 157, 175, 182, 185, 195–96, 210
- biorobotics, 30
- biotemplates, 159–63, 165–66, 168–69, 171
- biotemplating, 159–62, 164–67, 169–70
- BMD, *see* biomimetic design
- body and caudal fin (BCF), 47, 53, 58–59

- body and fins, 51–52
- body orientation, 43–44
- body roll, 41, 43
- body undulation, 31, 58
- body wave, 50–51
- CAD, *see* computer-aided design
- carbon nanotube (CNT), 126, 130, 132, 136
- Cassie–Baxter model, 203
- central nervous system (CNS), 230–31
- central pattern generator (CPGs), 59
- CFD, *see* computational fluid dynamics
- chemical vapor deposition (CVD), 204–5
- CNS, *see* central nervous system
- CNT, *see* carbon nanotube
- coefficient of friction (COF), 91, 93–94
- COF, *see* coefficient of friction
- complex maneuvers, 31–32, 52, 61, 63
- compression, 46, 85–86, 97–99
- compressive strain, 83, 85, 88, 98, 102–3
- computational fluid dynamics (CFD), 1, 4, 7, 47, 52, 56
- computer-aided design (CAD), 3–4, 9
- concavo-convex structure, 9, 157
- contact angle, 120, 133, 192, 203–9
- contact area, 5, 22–23, 25, 87, 95, 100–101, 104
- contacts, air-hair, 248–49
- copolymers, 218–20, 223
 - adhesive, 216
 - catechol-containing, 220
 - catechol-containing hydrophilic, 221
 - cross-linked, 217
 - hydrophilic polyacrylate, 221
 - MAP mimetic hydrophilic, 218
 - polystyrene, 220
- Coriolis force, 36
- CP, *see* critical point
- CPG, *see* central pattern generator
- Cramer's formula, 254
- crease patterns, 141–43, 147–48, 150, 152
 - asymmetric, 147
 - generalized, 142
 - optimal, 142
- crests, 86, 89, 92, 95, 97–98
- cricket wind receptor, 248–49, 252
- critical point (CP), 197
- cross-linking, 113, 115, 122, 213–14, 216–23, 276
- C-start, 30–31, 47, 52–53
- CVD, *see* chemical vapor deposition
- cyclic swimming, 47
- deformation, 81–82, 88–89, 91–93, 105, 166
 - plastic, 84, 95
 - spatiotemporal, 82
 - time-dependent, 82
- degree of freedom (DOF), 45
- denticles, 2–5, 7–8
- deployable structures, 140, 142, 153
- dewettability, 118
- diatom frustule, 125, 132–36
 - thermal-treated, 134
- DOF, *see* degree of freedom
- dolphins, 257–58, 260, 262, 264–68, 270
- DOPA, *see* 3,4-dihydroxy-*L*-phenylalanine
- downstream fish, 55–57
- drag, 4–5, 42, 55, 58, 238, 240–44
 - dead friction, 50
 - extra, 50
 - larger friction, 50

- EB, *see* electron beam
- EB lithography, 186
- echolocation, 257–59, 261, 264, 267
- echo sounders, 257–58, 263–65, 268
- ECS, *see* extracellular substance
- edge vortex, 35, 51, 61
- elasticity, 87, 143
- electromagnetic induction, 156, 158, 161–63
- electromagnetic microcoils, 158–59, 161, 163, 167, 169
- electromagnetic waves, 126, 155–58, 162, 200
- electron beam (EB), 186, 188, 274–78, 280–81
- electron beam irradiation, 275–76, 278
- Euler's buckling, 83
- Euler's constant, 240
- evolution, 19, 50, 57, 153, 251
 - temporal, 88
- extracellular substance (ECS), 276–77, 281–82

- fast Fourier transform (FFT), 233–34, 259, 265
- feathering motion, 45
- FE-SEM, *see* field-emission scanning electron microscopy
- FFT, *see* fast Fourier transform
- field-emission scanning electron microscopy (FE-SEM), 16–20, 24, 188, 275–76, 279–81
- filiform hairs, 230–33, 236
- fill factor, 201–2, 204, 209
- fins, 30, 48–52, 58–60, 62–63
 - anal, 52–53
 - anal/dorsal, 53
 - caudal, 47, 52
 - dorsal, 51
 - elongated, 59
 - flexible, 49
 - multiple, 53
 - paired, 47
 - rigid-ray, 49
- firebrats, 15–25
- fish, 29, 31–32, 47–60, 62, 263–65, 267–68
- fish robots, 58–61
- fish schools, 55–57, 264, 266–67
- flapping, 30–34, 36, 38, 40, 43–48, 59–61, 143
- flapping fins, 48, 52, 61
- flapping flight, 30, 32–33, 35–37, 39, 41, 43–45, 47, 63
- flapping wings, 30, 32, 34, 37–41, 43–46
- flexible wings, 30–31, 36–41, 46
- flight, 32, 35–36, 39, 41–44, 139, 142–43, 146–47, 150
 - autonomous, 30, 63
 - bird, 29, 31–32
 - controlled, 63
 - feeding, 42
 - flapping-wing, 30
 - forward, 36, 38, 40, 61
- fluid dynamics, 1, 4, 12, 47, 62–63, 240
- fluid-induced wing deformations, 39
- fluid structure interaction (FSI), 30–31, 37, 39
- flying, 29–34, 36–38, 40–46, 48, 50, 52, 54, 56, 58, 60–62, 64, 66, 68, 70, 257–58
- folding, 38, 140–42, 145–46, 148–53
 - easy, 142
 - left-overlying, 151–52
 - right-overlying, 151–52
- friction, 15–16, 20, 24, 81–83, 85–86, 88–95, 99–101, 103–5
- engineering, 82
- geometry-dependent, 93
- high, 22
- kinetic, 16

- low, 114
- friction forces, 15–16, 19–25,
 - 81–82, 87–89, 93, 99
 - average, 92, 99, 103
 - constant, 16
- frustules, 132–36
- FSI, *see* fluid structure interaction
- Galapagos shark, 4–5, 7
- Gaussian chirplet filters, 258–59
- Gaussian chirplets, 259–60
- Gaussian distribution, 234
- Gaussian tone filters, 259–60
- Gaussian white noise (GWN), 229, 233–36
- gelation, 115–17, 121, 218–19, 224
- gel matrix, 114, 119, 121
- groove heights, 6–7, 19–20, 24
- groove periods, 19, 22–25
 - heterogeneous, 25
 - inhomogeneous, 19, 24
- grooves, 2, 5–7, 22–24, 86, 92, 96–97, 100–101
 - asymmetric, 5–7
 - denticle, 5
 - symmetric, 7
 - wrinkle, 82, 92, 103
- groove structures, 2, 5–8, 17–19, 22–25, 100
- GWN, *see* Gaussian white noise
- hair base, 230, 234, 237–38, 244–45, 247–49
- hair deflections, 229, 234, 236, 239, 250, 252
- hair mobility, 235, 239, 250
- hair motion, 238, 242, 249–50, 253
- hairs, 126–28, 136, 229, 231–39, 241, 244–47, 249–50, 252–53
- hair shaft, 229–31, 234–35, 237–38, 242–47, 250, 252
- hawkmoths, 34, 39, 42
- Hertzian contact, 104
- hindwings, 142–43, 145–46, 149
- hydrodynamic interactions, 51–52
- hydrodynamics, 31, 47, 52, 55
 - flapping-fin, 30, 48
 - unsteady, 31, 47–48, 53
- hydrogels, 214–19, 224
- ILES, *see* implicit large eddy simulations
- implicit large eddy simulations (ILES), 34
- individuals
 - leading, 57
 - left-dominant, 150
 - right-dominant, 150
 - right-left-balanced, 150
 - solitary, 57
- insect body orientation, 42
- insect flapping wings, 38–39
- insect muscles, 38
- insect robot, 153
- insects, 15–16, 25, 29–32, 34, 36, 38–40, 42, 45–46, 48, 63, 81, 125, 139–40, 145–46, 148
 - primitive wingless, 16
- insect wings, 37, 48, 141, 143
- interaural range difference (IRD), 262
- ionic polymer metal composite (IPMC), 60
- IPMC, *see* ionic polymer metal composite
- IRD, *see* interaural range difference
- irradiation, 132, 156, 165, 276, 279
- Japanese bullhead shark, 3
- Japanese house bats, 258
- Japanese sawshark, 3
- juvenile mullets, 57
- Kármán gait, 54–56
- Kármán vortex streets, 54–56, 62
- kinematics, 37, 47, 49–50, 54, 56, 59, 61

- flapping-fin, 32, 49
- propulsive, 47
- rotating, 48
- wingbeating, 62
- Kirchhoff's law for thermal emittance equilibrium, 127
- laser-Doppler velocimetry (LDV), 230–31, 233–34, 246, 250
- LDV, *see* laser-Doppler velocimetry
- leading-edge vortex (LEV), 32–36, 40, 47, 49–50, 53, 61
- length dependency, 246–49
- LEV, *see* leading-edge vortex
- lift generation, 39–40, 45, 47
- lift-to-drag ratio, 40
- locomotion, 55, 58–59, 61
 - aerial, 44
 - high-speed, 139
 - ostraciform, 59
- locusts, 40, 140–41
- lotus-based metallic microcoils, 162
- lotus leaf, 195–96, 210
- maneuverability, 37, 46, 53, 57
- maneuvering, 30–32, 45, 47, 52–53
 - high-performance, 53
- mantas, 48, 58
- MAPs, *see* mussel adhesive proteins
- MAVs, *see* micro-air vehicles
 - bioinspired, 40, 46
 - biomimetic flapping-wing, 46
 - electric, 45
 - reproduced bioinspired flapping-wing, 63
 - small autonomous, 45
 - swimming robotics, 30
- mechanical durability, 95–98, 101
- mechanical energy, 238, 249–50
- MEMS, *see* microelectromechanical systems
- Michael adduct formation, 217
- Michael-type addition, 216, 219
- micro-air vehicles (MAVs), 30, 41, 45, 61
- microcoils, 161–64, 168–69, 171
 - copper, 169–70
 - electroconductive, 163
 - lotus-based, 167
 - metal, 161, 164
 - right-handed, 169–70
 - size-tunable, 165
 - templated, 168
- microelectromechanical systems (MEMS), 41, 63, 252
- microgrooves, 16, 24, 83
- microstructures, 16, 37, 120, 157–59
 - honeycomb-shaped, 130
 - metallic, 170
 - perfect left-handed spiral, 160
- microwrinkles, 84–86
- midwave infrared (MWIR), 130
- morpho butterfly, 129, 131, 176
- MORPHOTEX, 180
- moth eye, 183–84, 186–88, 190–93, 195–96, 198–99, 202–7, 209–10
- moth eye structures, 183–86, 188–89, 195
- moth eye surfaces, 183–86, 188–90, 192
- motions
 - flapping-wing, 45
 - hair shaft mass, 251
 - high-frequency rolling, 42
 - large rolling, 42
 - oscillatory, 60
 - periodic wave, 47
 - sinusoidal, 240
 - unsteady, 30
 - yaw, 60
- mussel adhesive proteins (MAPs), 216–19, 221, 224
- mussels, 213–17, 219, 224
- MWIR, *see* midwave infrared

- nanoimprinting, 186
- nanopillar arrays, 196–99, 201
- nanostructures, 15, 129–30, 198, 204, 207, 210
- NanoSuits, 275–80, 282
- nonsynergetic organogel (NSG), 117–19, 121–22
- normal loads, 82, 87, 89–94, 100, 104
- NSG, *see* nonsynergetic organogel
- organogels, 113–14, 116–17, 121–22
- oscillation, 39, 47, 51, 58, 61, 82, 89–90, 94, 99–100
 - periodic, 89
 - stick-slip-type, 99
- overlapped scales, 21–22
- overlapped wings, 149
- oxidation, 217–18, 220–22
- oxygen consumption, 54–55, 57
- particle image velocimetry (PIV), 33–34, 47, 50
- passive adjustments, 40, 62
- passive deformations, 40, 45, 48, 55, 60
- passive feathering, 37
- passive fin deformations, 48
- PDMS, *see* polydimethylsiloxane
- pectoral fin beat frequencies, 57
- pectoral fin frequency, higher, 57
- pectoral fins, 48, 52, 59
 - 2-DOF, 59
 - abducted, 52
 - oscillating, 48
 - paired, 58
- PEO, *see* poly(ethylene oxide)
- PET, *see* polyethylene terephthalate
- PIV, *see* particle image velocimetry
- polydimethylsiloxane (PDMS), 82, 88, 91, 93, 96–99, 102, 104, 113–19, 121–23, 220–21
- poly(ethylene oxide) (PEO), 217–18, 220–21
- polyethylene terephthalate (PET), 178–79, 188–91, 202, 206
- polymers, 115, 178–79, 181, 221, 223, 276–77, 281
 - barnacle cement mimetic, 223
 - catechol-containing, 219
 - durable, 276
 - electroactive, 60
 - high-refractive-index, 179
 - ionic, 85
 - light-responsive, 87
 - low-refractive-index, 179
 - polystyrene, 97
 - solvent-insoluble, 277
 - synthetic, 218
 - water-soluble, 279
- porous alumina, 183, 186–87, 189
- porous film, 96–99, 101
- pressure drag, 9
- propulsion, 44–45, 49–50, 53, 60, 63
- Reynolds number, 34–35, 39–40, 50, 61, 231
- riblet, 2, 4, 9–11
- rising flows, 4–5, 7–8, 11
- robots, 58–60, 153
 - amphibious snake, 59
 - anguilliform, 58
 - multiple underwater mobile, 59
 - novel amphibious snake, 58
- room temperature (RT), 121, 133, 163
- rove beetles, 139–40, 142–54
- RT, *see* room temperature
- saber-shaped mandibles, 127
- scales, 2, 16–25, 41, 57, 62, 83, 105, 139–40, 176–77
 - bird, 63
 - blue-red color, 33

- dense, 17, 19, 24
- firebrat's, 19
- head, 25
- insect, 18
- iridescent, 130
- placoid, 2
- whole-body, 25
- scanning electron microscopy (SEM), 2, 9, 163, 197, 245
- Schallamach waves, 82, 89, 92, 99
- self-lubricating gel (SLUG), 113–14, 117–23
- SEM, *see* scanning electron microscopy
- sensory cells, 230–31, 247–51
- shape memory alloy (SMA), 60
- shape tunability, 85, 88, 96
- shape-tunable microwrinkles, 86, 97
- shape-tunable wrinkles, 81–84, 86–90, 92–94, 96, 98, 100–102, 104–6, 108, 110
- shark skin, 1–8, 10–12
- signal-to-noise ratio (SNR), 234, 258–59, 261
- Simpson's approximation formula, 244, 246
- slippery liquid-infused porous surfaces (SLIPS), 118, 121–23
- SLIPS, *see* slippery liquid-infused porous surfaces
- SLUG, *see* self-lubricating gel
- SMA, *see* shape memory alloy
- SNR, *see* signal-to-noise ratio
- spiral structure, 161, 166
 - left-handed, 165
 - multiple, 160
- spiral vessels, 160–63
- Spirulina, 165–70
- split-beam echo sounder, 265
 - broadband, 264–65
- split-beam system, 264, 268
 - broadband, 266–67
- SQUID, *see* superconducting quantum interference device 163–64
- SSE, *see* surface shield enhancer
- Stokes's mechanical impedance, 240, 248
- Stokes's theory of viscosity, 230
- stroke amplitude, 42–44
- stroke plane angle, 43–44
- stroke reversal, 39
- stroke-to-stroke variability, increasing, 43
- Strouhal numbers, 39, 49–50, 56–57
- structural colors, 18, 175–80, 182
- superconducting quantum interference device (SQUID), 163–64
- superhydrophilicity, 204
- superhydrophobicity, 113, 119–20, 122, 204
- surface shield enhancer (SSE), 279–82
- swimming, 29–32, 34, 36, 38, 42, 44, 46–50, 52–54, 56–64, 66, 68, 70, 72, 74, 76
- swimming gait, 55, 58
- swimming hydrodynamics, 30–31, 47, 54
- swimming kinematics, 55
- swimming modes, 52, 56, 61
- syneresis, 113–15, 117–18, 121–23
- tail, 2, 18, 24–25, 45, 49–50, 52, 56, 278
 - factual-shaped fish, 49
 - hydrophobic, 223
- tail beats, 52, 57
- tail fin, 49, 52, 58–59
- thermal conduction, 126, 128, 135
- thermal convection, 126, 128, 132
- thermal management, 125–26, 128–30, 132–36, 138

- thermal noise, 251–52
- thermal radiation, 126, 128, 136
- thermoreponsive self-lubricating gel (TR-SLUG), 121–22
- topographies, 2–3, 21–23, 82
 - wrinkled, 93
- torques, 43, 238, 244, 253
 - external, 238–39
 - restoring, 237
 - small, 243–44
 - theoretical, 230
 - total, 243–44
 - turning, 244
- transfer functions, 234–36
 - electromechanical, 233
 - frequency-domain, 234
 - linear, 234
 - stimulus-response, 229
- tribological properties, 81, 87, 95–96
- TR-SLUG, *see* thermoresponsive self-lubricating gel
- turbulence, 30–31, 40–41, 43–44, 53–55, 62
 - atmospheric, 41
 - background, 43–44
 - grid, 31, 43
 - homogeneous isotropic, 43
 - small-scale, 41
 - strong, 44
 - weak, 44
- UA, *see* urethane acrylate
- UA moth eye, 207–9
- ultraviolet (UV), 188–90, 202
- undulations, 47, 50–51, 56, 58–59, 97
 - periodic, 83
- undulatory, 30, 47, 49–51, 60–61
- unsteadiness, 31, 39, 43, 47, 54
 - environmental, 62
 - high, 31
- unsteady biomechanical mechanisms, 30
- unsteady environments, 30–32, 47, 54, 61
- urethane acrylate (UA), 202, 205–8
- UV, *see* ultraviolet
- vacuum, 38, 126, 128, 131, 162, 273–75, 277, 279
 - high, 274–76, 278–81
- van der Waals interactions, 223
- velocity, 5, 118, 229, 232–34, 238–42
 - angular, 234, 253
 - average, 36
 - gas, 8
 - instantaneous, 232
 - peak, 232, 235–36, 240
 - relative, 55, 242
 - tangential, 229, 233–34, 236
 - tangential motion, 231
 - uniform inflow, 36, 61
 - wind, 250
- viscosity, 118, 230, 250
 - kinematic, 34
- vortex, 4–8, 11, 31–35, 42, 48–49, 51–52, 54–56
 - diffuse, 35
 - edge, 48
 - horseshoe, 50
 - leading-edge, 30, 32
 - linked, 52
 - negative secondary, 36
 - pectoral fin, 52
 - pectoral-fin-induced, 52
 - secondary counterrotating, 35
 - single and double row, 49
 - strong, 33
 - tornado, 42
 - unsteady, 50
 - unsteady high-intensity, 50
 - ventral-edge, 61
- vorticity, 35–36, 50
- wake, 36, 48–50, 52–53, 55–57
- water repellency, 210

- extraordinary, 197
- superior, 118
- Wenzel model, 203–4, 207–9
- wind receptor hairs, 229–30, 237–39, 244–47, 249
- wind tunnel, 44, 232–33
- wingbeat frequency, 38–39, 42–44
- wing deformation, 37–38
 - passive, 39
- wing folding, 142–43, 145–49, 151
 - expeditious, 150
 - extraordinary right-left
 - asymmetric, 146
 - sophisticated, 142
- wing kinematics, 32, 37–38, 40, 42–43, 45
 - artificial, 40
- wing planform, 34, 37
- wings, 30–40, 42, 44–46, 62–63, 129–32, 136, 139, 141, 143, 145–50, 152–53, 175–79
 - bird, 143
 - deployable, 140–41, 153
 - flapping and revolving, 32–33, 61
 - foldable, 139–40
 - folded, 143, 150
 - hawkmoth, 38
 - hind, 38
 - hypothetical, 142
 - paired, 46
 - revolving bumblebee, 33
 - revolving fruit fly, 33
 - revolving rectangular, 34
 - revolving triangular, 34
 - rigid, 39, 63
 - rotated hawkmoth, 38
 - scaled-up robotic, 34
 - stored, 149
 - thin, 32
 - two-way-foldable, 152
 - underriding, 149
 - unfolding-stable-type, 145
- wingspan, 40, 45–46
- wing structures, 32, 38, 140, 153
- wing surface, 33, 36, 40, 196
- wing tip, 34–36
- wrinkle crest, 94, 96, 104
- wrinkled surfaces, 82, 85, 88–93, 104
 - deformable, 93
- wrinkles, 19, 82–96, 98–99, 101–3, 105
 - aligned, 82, 92
 - periodic, 94
 - porous-film-embedded, 95, 99
 - textile-embedded, 103–4
- wrinkling, 85, 87, 95–99
- X-ray micro-CT, 1–4, 8, 11–12
- X-wing, 45
- X-wing MAV, 46
- yaw amplitudes, 43
- Young's modulus, 83, 91, 95

Biomimetics is an innovative paradigm shift based on biodiversity for sustainability. Biodiversity is not only the result of evolutionary adaption but also the optimized solution of an epic combinatorial chemistry for sustainability, because the diversity has been acquired by biological processes and technology, including production processes, operating principles, and control systems, all of which differ from human technology. In the recent decades, biomimetics has gained a great deal of industrial interest because of its unique solutions for engineering problems.

In this book, researchers have contributed cutting-edge results from the viewpoint of two types of industrial applications of biomimetics. The first type starts with engineering tasks to solve an engineering problem using biomimetics, while the other starts with the knowledge of biology and its application to engineering fields. This book discusses both approaches. Edited by Profs. Masatsugu Shimomura and Akihiro Miyauchi, two prominent nanotechnology researchers, this book will appeal to advanced undergraduate- and graduate-level students of biology, chemistry, physics, and engineering and to researchers working in the areas of mechanics, optical devices, glue materials, sensor devices, and SEM observation of living matter.



Akihiro Miyauchi is a nanotechnology researcher currently working as professor at Tokyo Medical and Dental University, Tokyo, Japan. He received his bachelor's in theoretical physics from the Tokyo University of Science and his master's and PhD from the Tokyo Institute of Technology. He was a visiting scientist at the Massachusetts Institute of Technology (MIT) in 1995–1996 and chief researcher at Hitachi Ltd. for 10 years, where he led four national projects on nanoimprinting and biomimetics. Prof. Miyauchi is session chair of the International Microprocesses and Nanotechnology Conference and a member of the International Conference on Nanoimprint and has been an expert advisor for the Ministry of Education and New Energy and Industrial Technology Development Organization (NEDO), Japan. He has developed high-speed integrated circuits for optical communication using selective CVD, cell cultivation plates for regenerative medical, fluid control machines, and fuel cells. His current research involves biomimetics for fluid control and antibiofouling using informatics.



Masatsugu Shimomura graduated from Kyushu University, Japan, after which he worked as assistant professor in the field of biomimetic chemistry in Prof. Toyoki Kunitake's laboratory. He moved to the Tokyo University of Agriculture and Technology, Japan, as associate professor, where he researched polymeric Langmuir–Blodgett films. Then he moved to Hokkaido University, Japan, for starting a new laboratory to work on bottom-up nanotechnology based on self-organization and biomimetics. Concurrently, he held the post of principle investigator at RIKEN, Japan, where he developed self-organized honeycomb-patterned polymer films in collaboration with many industrial companies. After moving to Tohoku University, Japan, Prof. Shimomura organized a national research project on engineering neobiomimetics and started an educational program on biomimetics at the Chitose Institute of Science and Technology, Japan. He has also worked with Prof. Helmut Ringsdorf of the University of Mainz, Germany, and Prof. Erich Sackmann of TU-Munich, Germany.



JENNY STANFORD
PUBLISHING

