

Index

- Abbott Laboratories, 170
Abbreviated new drug application (ANDA), 93
Accelrys, 280
Acquisitions
 deal process, 274–275
 examples of, 272–273
 as financing mechanism, 268, 270–271
 preparation for, 274
 regulatory issues, 274
 targets of, 274
Action Group on Erosion, Technology, and
 Concentration (ETC), 51–54, 58, 60,
 63, 133
Acusphere, 203, 276
Adenosine triphosphate (ATP), 92
Advanced biotechnology, 45
Advanced Imaging Systems, 272
Advanced Measurement Laboratory (AML),
 NIST, 263–265
Advanced Technology Materials, Inc., 70, 216
Advanced Technology Program (ATP), as
 funding resource, 124, 176, 191, 194, 283
Advertising, 173
Advion Biosciences, 203
Advisory panels, 99
Aerospace applications, 28–29
Age of Spiritual Machines, The (Kurzweil), 44
Agile Materials & Technologies, Inc., 201–202
Agreement on Technical Barriers to Trade, 62
Agreement on the Application of Sanitary and
 Phytosanitary Measures, 62
Agricultural biotechnology, 43
Air pollution control, 80
Air Products, 202, 238, 243
Alien Technology, 203
Alivisatos, Paul, Dr., 156
Allergenic extracts, 88
Aluminum nanoparticles, 22
Amberwave Systems, 200
American National Standards Institute (ANSI),
 261
American Society for Mechanical Engineers
 (ASME), 262
American Supersonic Transport, 120
Ames Center for Nanotechnology, 148
Amyotrophic lateral sclerosis, 171
Angel investors, 189–191
Angstrovision, 200
Angular momentum, 24
Animal studies, 54, 56
Antidilution protection, 207, 256
Antitrust, 81
Apax Globis Partners & Co., 247
Apparatus claims, patent applications, 216
Apple, 158
Applied Epi, 272
Applied Nanotechnologies, 253
Arbitrary and fanciful trademarks, 231
ARCH Venture Partners, 20
Ardesta, 200, 205
Argonne National Laboratory, 159
Ariadne Capital, 247
Arms Control and Disarmament Agency, 107
Arryx, 201
Articles of incorporation, 154–155
Artificial brains, 24–25
Artificial intelligence, 98
Artificial Muscle, 202
Asbestos, 52, 62
Asbestos Ban and Phaseout, 62
Asian market, 170
Asian research institutions, 248
ASML Holding NV, 238, 244
Assembler, 29, 31
Asset purchase agreements, 275
Athenson, Bill, 170
Atlantic Nano Forum, 79
Atomic energy, 80
Atomic force microscope, 16, 21, 172
AtomWorks, 159
Aveka, 273–274

Baker, James, Dr., 96, 156, 169
Balance sheets, 175
BASF, 202, 239
Bawendi, Moungi, Dr., 156
Bayer, 170, 202
Bayh-Dole Act, 140, 143–144
Bell, Randy, 237
Best Efforts agreement, 278
Betanaphthylamine, 56
Big 5 Consulting Firms, 187
BinOptics, 201
Biological detection applications, 23–24

- Biological products, clinical testing of, 88
 Biotech derived therapeutics, 88
 Biotechnology
 innovations in, 47–48, 197
 patents, 68
 products, 97
 Block, Steven M., 13–14
 Block copolymers, 20
 Blocking patents, 79–80
 Blonder, Greg, 201–202
 Blood and blood components, 88
 Blood collection and processing, 90
 Board of directors, functions of, 155, 275
 Bock, Larry, 38, 156
 Boeing, 202
 Bond offering, 268
 Bottom-up fabrication, 15–16, 122, 179
 Bridge financing, 269
 Bronchoalveolar inflammation, 55
 Brus, Louis, Dr., 156
 Buckminsterfullerene, 17
 Buckyballs, 27
 Bucky USA, 253
 Building nanotechnology
 large, 29–31, 167–168
 small, 23–29, 167–168
 Bulge bracket investment banks, 187
 Bureaucracy, 112, 128–129
 Bureau of Industry And Security (BIS),
 105–108, 110
 Business entities, nano start-ups, 153–154
 Business plan
 Executive Summary, 163–165
 financial modeling, 174–175, 179
 importance of, 161–162
 information sources for, 176–178
 key elements of, 163–164
 market selection, 166–171
 operations, 172–174
 outsourcing, 186–187
 purpose of, 162–163
 risk disclosure, 171–172
 sources and uses, 179–181
 valuation, 181–186
 Bylaws, 55
 Cabosil amorphous silica, 55
 California Molecular Electronics Corporation,
 280
 California Nanosystems Institute (CNSI), 117,
 159
 Cancer/carcinogenicity, 57, 60
 Canon, 202
 Canon nanotubes, 252–253
 Capstone Turbine, 203
 CarboLex, 253
 Carbon, 218
 Carbon Nanotechnologies, 76, 143, 238, 253
 Carbon nanotubes, 17–18, 38, 52–53, 55–56,
 64, 69–70, 72, 79, 215–216, 224, 259
 Carbon Solutions, 253
 CAS, 213
 Cash flow, 174–175
 Catalytic Solutions, 37, 165, 202
 C corporations (C Corps), 153–154, 157, 282
 Celera Genomics, 206
 Cellular therapies, 28, 90, 95
 Center for Biological and Environmental
 Nanotechnology (CBEN), 64
 Center for Biologicals Evaluation and Research,
 (CBER), 88–92, 99–100
 Center for Devices and Radiological Health
 (CDRH), 87–91, 98–100
 Center for Drug Evaluation and Research
 (CDER), 86–93, 100
 Center for Functional Nanomaterials, 146
 Center for Integrated Nanotechnologies, 146
 Center for Nanophase Materials, 146
 Center for Nanoscale Materials, 146
 Central Coast Angel Network, 190
 Chemical interactions, 91
 Chemical patents, 68
 Chemical self-assembly, 16
 Chemical sensors, 23, 168
 Chemical vapor deposition (CVD), 77, 80, 172
 Chlorogen, Inc., 201
 CibaoGeigy, 259
 CIENA, 203
 Citizen advisory panels, 48
 Citrix, 203
 Classification, FDA regulation, 86–93
 Clayton Act, 257–258, 275
 Clean rooms, 172
 Clinch River Breeder Reactor, 120
 Clinical testing, importance of, 98
 Clinical trials, significance of, 94–96, 171
 Clinton Administration, 115–116
 Cloning, 19
 Coal, conversion to liquid fuel, 22
 Coatings, 22, 169
 Coatue, 201, 273
 Cohen, Linda, 120
 Colloidal crystals, 218
 Colvin, Vicki, Dr., 58, 96
 Combined research and curriculum
 development (CRCDD), 124
 Commerce Control List (CCL), 106–108, 110,
 113
 Commercialization, 130, 135, 239–240, 262,
 283–284
 Committee on Foreign Investment (CFIUS),
 111
 Common law doctrines, 229
 Common stock, 206, 256
 Communications devices, 26
 Compact Model Council (CMC), 265
 Compaq, 203
 Comparable Company Analysis, 182–184
 Competition, as influential factor, 168
 Composite patents, 68
 Compulsory licensing, 79–80
 Computational nanotechnology, 21
 Computer chips, 24
 Computer Retrieval of Information on
 Scientific Projects (CRISP), 177
 Confidential information, 227–228

- Confinement, 17
- Consolidation
 - benefits of, 251–252, 254–255, 284
 - merger agreements, 255–258
 - regulatory concerns, 258–259
- Consultants, 99, 187
- Consumer electronic industry, 34
- Continuation-in-part patent application, 29–220
- Continuum Photonics, Inc., 201
- Contract law, 150
- Contractual tools, 229–230
- Conversion rights, venture capital criteria, 207
- Convertible debt, 268–269
- Cooperation, benefits of, 284
- Cooperative licensing agreements, 75–77
- Cooperative Research and Development Agreements (CRADAs), 99, 124, 210
- Copyrights, 233–234
- Corporate claims, patent applications, 215–216
- Corporate governance
 - articles of incorporation, 154–155
 - board of directors, 155
 - management, 156–157
 - scientific advisory board (SAB), 155–156
- Corporate partnering
 - benefits of, 284
 - strategic fit, 274
- Corporate spinoff, 149–151
- Corporation investment, 118
- Co-sale agreement, 208
- Cost-benefit analysis, 63
- Credibility, sources of, 156, 174, 191, 239
- Cross-licensing agreements, 76, 211
- C Sixty, 38, 171
- Customer service, 173
- CVC, 272
- Cypress, 203

- Databases, of inventions, 213
- Data storage, 25
- Debt, as financing mechanism, 269
- Decision-making skills, significance of, 282
- Deemed export rule, 106
- Defense Advanced Research Projects Agency (DARPA)
 - Contracts Management Office (CMO), 193
 - as funding resource, 177, 191, 193–194, 283
- Defense Security Service (DSS), 111
- Defense systems, 29
- Dehumanization, 44
- Dekker, Cees, 24
- Dendrimers, 27, 218
- Deoxyribonucleic acid (DNA), 19–20, 27, 43
- Department of Defense (DOD)
 - Comptroller, 177
 - grant funding, 193
 - security issues, 103, 111
 - technology dissemination, 146–147
- Department of Energy (DOE), 112, 146
- Department of Justice Reauthorization Act, 68
- Descriptive trademarks, 231–232
- Device system, patent applications, 216
- Diabetes, 97, 179
- Diagnostic applications, 27–28, 34, 167
- Diagnostic devices, 96
- Diagnostic tests, 170
- Dialog, 213
- Digital Instruments, 273
- Dip-pen lithography, 36
- Dip pen nanolithography, 16
- Direct exposure, health effects, 57
- Direct mail, 173
- Direct public offerings (DPOs), 279–280
- Direct sales force, 173
- Discera, 200
- Disclosure
 - business plan, 171–172
 - consolidations, 256
 - corporate spin-offs, 150
- Discounted cash flow (DCF), 182, 184–186
- Discount Rate, 185
- Disease screening, 28
- Disposal systems, commercial, 172
- Dispute resolution, 144, 247
- Distribution, corporate partnering, 243, 245
- Dividend preferences
 - corporate partnering, 243
 - venture financing criteria, 207
- DNA sequence analysis, 169
- Draper Fisher Jurvetosn (DFJ), 200–201
- Drexler, K. Eric, 29–31
- Drug, defined, 86
- Drug delivery devices, 171
- Drug delivery systems, 27, 34, 91
- Drug development, 27, 60, 171
- Due diligence, in venture financing process, 203, 205
- DuPont, 34, 56, 202, 277
- DuPont Electronic Technologies, 238, 246
- D-Wave Systems, 199, 201
- Dynamic random-access memory (DRAM), 25, 265

- Eagle Picher, Inc., 245
- EaglePicher Technologies, 238
- Ear99, 106
- Early stage financing
 - financing strategy, 190
 - government funding, 191–194
 - seed round, 190–191
 - venture capital, 194–208
- Early-stage companies, valuation metrics, 183, 186
- E-beam lithography, 15
- Echo Technologies, 192
- Economic Espionage Act (EEA), 229
- Edgar Online, 178
- Education programs, 48
- Egelhoff, William, Jr., 262
- EiComendex, 213
- Eisenberg, Rebecca, 77
- Electromagnetic radiation, 15
- Electronic applications, 24–26, 168–169
- Electronic devices, 38
- Eli Lilly, 236

- Embossing, 15
- Embryonic stem cells, 143
- Emerging markets, growth in, 179
- Emerging technologies, 43, 83, 97–99, 100, 236
- Employee(s)
 - employment contracts, 150
 - stock option plans, 157–158
- Enablement doctrine, 221–222
- End-product development, 76
- Energy conversion and storage, 26
- Energy industry, 34
- Enforcement process, patents, 226
- Engineered nanomaterials, 55
- Enplas, 238, 245
- Environmental Protection Agency (EPA),
 - regulation by, 51, 53, 60–64, 133, 171, 173
- Environmental regulation
 - data analysis, 56–58
 - data collection, 54–56
 - increasing environmental concern, 52
 - international law, 62–63
 - legal analysis, 60–63
 - normative analysis, 58–60
 - recommendations for, 63–64
 - regulatory action, timing of, 53–54
 - regulatory review, 53
 - toxicity, 54
 - U.S. law, 61–62
- Environmental risks, 170–171
- Epidemiological studies, 54, 56
- Equity investment, 243–244
- Espin Technologies, 192
- Essilor, 238
- Estoppel, 217
- Ethical implications
 - First Amendment protection, 46–47
 - immediate action, 42–43
 - legal analysis, 46
 - overview of, 41–42
 - policy analysis, 43–46
- European Committee for Standardization (CEN), 262
- European research institutions, 248
- Exclusive licensing, 143
- Executive Summary, business plan, 163–165
- Exit opportunities
 - acquisitions, 271–275
 - financing mechanisms, 268–271
 - initial public offerings, 267–269, 275–280
- Export Administration Regulations (EAR),
 - Department of Commerce
 - applications to nanotechnology, 108–110
 - defined, 105
 - summary of, 105–108
- Export Control Classification Number (ECCN), 106–107
- Export control laws
 - Department of Commerce, 105–110
 - future directions for, 113
 - importance of, 112
 - regulation of, 104–105
 - significance of, 171
 - State Department, 110–111
 - state of, 104
- Exposure, toxicity research, 57
- Factica, 213
- Fair pricing, 82
- Family, as financial resource, 189–190
- FDAMA, 89
- FedBizOpps, 177
- Federal funding
 - future directions for, 128–130
 - historical perspectives, 115–116
 - management of, 120–128
 - overview of, 116
 - reasons for, 119
- Federal Laboratory Consortium, 177
- Federal Laboratory Consortium for Technology Transfer (FLC), 146
- Federal Trade Commission (FTC), 259
- Fees, licensing, 144
- FeRx, 192
- Feynman, Richard, 14–15, 281
- Field emission devices, 38, 168
- Films, macroscopic, 22–23
- Final Prospectus, 279
- Financial modeling, business plan components
 - independent estimates, 179
 - market estimates, 175
 - methodology, 174
 - third party sources, 175
 - time frame, 174–175
- Financial projections, importance of, 174–175, 179–180
- Financial resources
 - federal funding, 115–116
 - foreign public spending, 117–118
 - private investment, 118
 - state funding, 117
- Financing
 - early stage, *see* Early stage financing
 - future rounds, 208
 - stages of, 283
- Firm Commitment, 278
- First Amendment protection, 46–47
- FirstGov, 177
- Five Forces Model, 169
- 505(b)(2) application process, 93, 95, 102
- Five Star Technologies, Inc., 199, 202
- Flash technology, 25
- Flat panel displays, 34
- Flexics, 201
- Food and Drug Administration (FDA)
 - regulation
 - agency effectiveness strategies, 98–99
 - challenges of, 86–101
 - classification problems, 86–93
 - product approval, 93–96
 - scientific expertise issues, 96–101
 - significance of, 83–86, 171, 173
 - state of the FDA, 84
- Food, Drug, and Cosmetic Act, 88

- Foreign investment, as financial resource, 195
- Foreign patent applications, 223–224
- Foreign public spending, 117–118
- Foresight Guidelines, 48–49
- Founding technologists, managerial functions, 156
- Fqubed, 202
- Freitas, Robert, 92
- Friends, as financial resource, 189–190
- Frontier Carbon Corporation, 202, 253
- Fullerene antioxidants, 171
- Fullerene International Corporation, 202
- Fullerenes nanotubes, 17, 21
- Full ratchet formula, 207
- General Agreement on Tariffs and Trade (GATT)
 - provisions, 62
 - TRIPS Agreement, 249
- Generic trademarks, 231–232
- Gene therapies, 88, 98–99
- Genetic antisense technology, 222
- Genetic engineering, 42
- Genetic testing, 99
- Genomics, 98
- Globalization
 - foreign corporations and investors, 247–248
 - foreign ideas/talent, 247–248
 - intellectual property, protection of, 247, 249
 - manufacturing abroad, 247, 249
- Goddard Center, 148
- Good Manufacturing Practices (GMPs), 87
- Google, 158
- Government agencies, as information resource, 176
- Government funding
 - Advanced Technology Program (ATP), 194, 283
 - criterion for, 191
 - Defense Advanced Research Projects Agency (DARPA), 193–194, 283
 - SBIR/STTR grants, 193, 283
- Government interest, 47
- Government interventions, patent process, 79–80
- Government laboratory spinoff
 - characteristics of, 146–149
 - intellectual property, generation of, 210–211
- Grubstein, Peter, 163, 203
- Guidance Document, FDA regulation process, 95
- Handylab, 200
- Harrigan, Kathryn, 236
- Harris & Harris Group, Inc., 201
- Health risks, 170–171
- Heat shock protein 60, 19
- Heath, James, Dr., 156
- Heeger, Alan, 202
- Heller, Michael, 77
- Henney, Jane, 97–98
- Hewlett-Packard (HP), 24, 118, 158
- High-dose studies, 57
- High-growth companies, valuation metrics, 183, 185–186
- HIV, 171
- Holdover clauses, 150, 229
- Holmenkol (Loba), 238
- Holmenkol Sport-Technologies GmbH & Co., 244
- Homopolymers, 222
- Honjo Chemical Corporation, 202
- Hotmail, 200
- House Government Operations Committee, 105, 108
- HP Labs, 197
- Hyperion Catalysis International, 69, 71, 216, 253
- HyperNex, 201
- IBM, 24–25, 34, 70–71, 118, 216, 224–225, 253
- IBM SXM, 272
- IEEE 802, 261, 264–265
- IFI CLAIMS, 213
- Iijima, Sumio, 17
- Iijin Nanotech, 253
- Imago, 201
- Immunicon, 199
- Impinj, 200
- Incentive stock options (ISOs), 157
- Income statements, 175
- Indirect exposure, health effects, 57
- Industrial production, 59
- Industrial structure
 - companies commercializing nanotechnology, 34, 37–38
 - established companies integrating nanotechnology, 34, 36
 - model of, 35, 38
- Industry journals, as information resource, 176
- Inevitable disclosure doctrine, 229
- Infringement
 - copyright, 233
 - corporate partnering and, 245
 - patent, 211, 217, 224–226
- Inhalation exposure, 62
- Inhalation toxicity, 55, 57
- Inherent anticipation doctrine, 220–221
- Initial public offering (IPO)
 - benefits of, 267–269, 275
 - candidates for, 277–278
 - examples of, 276
 - future directions for, 279–280
 - mergers and acquisitions (M&A), 270
 - process overview, 278–279
 - regulation of, 276
 - SEC registration, 275–276
- InMat, 199, 202
- InnovaLight, 200, 203
- Innovation Engine, 247

- Inorganic nanomaterials, 17–18
 INPADOC, 213
 INSPEC, 213
 Institute of Electrical and Electronics Engineers (IEEE), 261–265, 284
 Insulin, 97
 Insurance companies, as financial resource, 195
 Intel, 34, 239, 277
 Intellectual property
 commercialization and, 283
 copyrights, 233–234
 corporate spin-offs, 149
 generation of, 210–211
 initial, 140–151
 market segmentation and, 170
 patents, 211–227, 283
 protection strategies, 71, 74, 77, 82, 209–210
 regulation of, 134
 trademarks, 230–233
 trade secrets/confidential information, 227–230
 in venture financing process, 203, 205
 Intematix, 201
 Intercenter Agreement, 90, 92
 Interference proceedings, pending patents, 222–223
 Interferon, 97
 International agreements, 45
 International Electrotechnical Committee (IEC), 261
 International law, 62–63
 International Organization for Standardization (ISO), 261, 265
 International Traffic in Arms Regulations (ITAR), State Department
 application to nanotechnology, 110–111
 defined, 110
 summary of, 110
 Internet stocks, 162
 Investigation Device Exception (IDE), 87
 Investigational New Device (IND), 87
 Investment banks
 acquisition preparation, 274
 as financial resource, 187, 195
 initial public offerings (IPOs) process, 276, 278
In vivo replication, 96
 Ion Optics, 200
 Ion Tech Inc., 272
 Iron nanocrystals, 64
 Jacobson, Elizabeth, 86
 Japanese nanotechnology programs, 117–118
 JAPIO, 213
 JEDEC, 265
 Joy, Bill, 42
 Juniper Capital Ventures Ptd. Ltd., 247
 Jurisdictional designation, FDA regulation process, 89–91
 Jurvetson, Steve, 196, 200
 Kahan, Jonathan, 95
 Key management, 174, 242
 Khosla, Vinod, 166, 181, 276
 Konarka Technologies, 38, 200–202
 Kurzweil, Ray, 44
 Labeling, investigational drug, device, or biological products, 88
 Lagally, Max, 37, 144
 Langer, Robert, 86
 Langley Research Center, 148
 Language, in patent application, 217–218
 Lanham Act, 231
 Laser, Zia, 38
 Lasers, 38
 Legal analysis, 46
 Letter of intent (LOI), 274–275
 Leukemia, 97
 LexisNexis, 178
 Liability
 corporate partnering and, 244
 mergers, 275
 Licensing
 agreements, *see* Licensing agreements
 components of, 79–82
 consolidations and, 254
 corporate partnering, 243, 246
 patents, 226
 standardization and, 265
 Licensing agreements
 government laboratory spinoffs, 149
 patent infringement, 225–226
 university spin-offs, 140, 143–145
 Licensing negotiations, 144
 Lieber, Charlie, Dr., 24, 156
 Life sciences, 167, 170
 LightConnect, Inc., 202–203
 Limited liability companies (LLCs), 153–154, 282
 Limited liability partnerships, 195
 Liquidation preferences
 corporate partnering, 243
 venture financing criteria, 206–207
 Lithography, 15
 Litigation
 patent infringement, 54, 79, 211, 214, 217, 225–227, 246, 254
 trademark, 233
 Location, significance of
 Massachusetts, 159
 New York, 159
 Northern Illinois, 159
 Silicon Valley, 158–159
 Southern California, 159
 Texas, 159
 Washington, D.C., 160
 Logos, 230
 Lotus, 203
 Loyalty, 229
 Lucent, 34
 Luminus Devices, 201

- Lung cancer, 62
Luxtera, 203
- McGehee, Mike, 196
Magnesium oxide particles, 55
Magnetic resonance (MR) scanners, 94
Managerial functions, 156–157, 163. *See also*
Key management
- Manufacturing
corporate partnering, 243–245
in foreign countries, 249
operations, 172–173
- March-in rights, 210
Marketing, *see* Sales and marketing
marketresearch.com, 178
Market segmentation, 167
Market selection, business plan guidelines
customer identification, 166
influential factors, 167–171
market focus, 166
market segmentation, 167
- Marlowe, Donald, 99
Mass production, 59
Massachusetts Technology Collaborative, 159
Materials and Electrochemical Research
Corporation, 202, 253
Matsushita Electric, 238, 277
Maturation stage, in business life cycle, 174
Mechanical interaction, 91
Mechanosynthesis, 29
Medical device, regulation of, 87–88, 90
Mergers, as financing mechanism, 268,
270–271
- Mergers and acquisitions (M&A), *see*
Acquisitions; Mergers
- Merging companies
agreements between, 255–256
agreement within company, 257–258
- MesoSystems, 200
Mesothelioma, 62
Metal nanoparticles, 216
Meyyappan, Meyya, 29
Microbivores, 92
Microelectromechanical systems (MEMs),
200–201, 203, 261
Microelectronics, 24
Microfabrica, 201
Micronics, 200
MicroOptical Devices, 200
Microtechnano, 253
Microtechnology, 197
Mirkin, Chad, 16, 37, 156
Mission statement, 163
MIT, 144, 217
Mitsubishi Chemical Corporation, 202
Mitsubishi Corporation, 202
Mitsubishi Gas Chemical, 238
Mobil, 34
Modzelewski, Mark, 117
Molding, 15
Molecular Foundry, 146
Molecular Imprints, 199, 201
Molecular manufacturing, 29–31, 110, 113
Molecular Nanosystems, 38, 77, 143, 253
Molecular Solutions, 201
Monarch, 272
Monoclonal antibodies, 91
Monopolies, 170, 275
Moore's law, 24
Morgenthaler Ventures, 201–202
MPEG-2 compression, 76
MRC Process Equipment, 273
Multex, 178
Multi-walled nanotubes (MWNTs), 17
Munitions List, export control laws, 110–111
- Naming a company, 151–152
Nano Age, 132
Nano Lab, 253
NanoBio Corporation, 27, 38, 156, 169–170,
192
Nanobio tools, 179
NanoBusiness Alliance, 72, 196, 200
NanoBusiness Angels, 190
Nanocarblab, 253
Nanocompany start-up process
business plan, 161–187
components of, 139–160
consolidation, 251–259
corporate partnering, 235–247
early stage financing, 189–208
exit opportunities, 267–280
globalization, 247–249
intellectual property, 209–234
standardization, 259–265
- NanoCoolers, 201
Nanocor, 238
Nanocyl, 253
NanoDevices, 273
Nanodots, 218
Nanogate Technologies, 37, 238, 244
Nanogen, 183, 211, 276, 285
Nanogram Devices Corporation, 170, 199,
201, 238, 245
NanoInk, Inc., 37, 156, 192, 199, 230
NanoInvestorNews, 33
Nanolegde, 253
Nanolithographic printing, 230
Nanomed Pharmaceuticals, 60
Nanomaterial products, 83
Nanomaterial research, 28
Nanometrics, 151, 173, 285
Nanomix, 38, 151–152, 192, 203, 238, 246,
253
Nanomuscle, 199
NanoNexus, 199
NanoOpto Corporation, 166, 199, 201–202,
238, 245
Nanoparticles, 21, 218
Nanopharma Corporation, 201
Nanophase Technologies Corporation, 37,
200–201, 276–277

- Nanopowders Industries, 274
- Nanorobots, self-replicating, 43, 45, 48, 171.
See also Nanorobot technology
- Nanorobot technology, 30, 92, 96–97
- Nanoscale Exploratory Research, 124
- Nanoscale Science, Engineering, and Technology (NSET), 121
- Nanoscale Science Research Centers (NSRC), 146–147
- Nanoscience
 building blocks of, 15–19
 historical perspectives, 14–15
 organic nanomaterials, 19–20
 tools, 21–22
- Nanosolar, 170, 199
- Nanosphere, 38, 156, 170, 192, 199, 202, 245
- Nanostream, 199
- Nanosys and Quantum Dot Corp., 70–71
- Nanosys, Inc., 74, 156–157, 170, 181, 192, 194, 197, 199–201, 203, 212, 238, 271, 275–277, 285
- Nanotech Partners Limited, 202
- NanoTech Resources Inc., 160
- Nanotechnologies, Inc., 201, 238, 243
- Nanotechnology
 applications, overview of, 22–31
 defined, 13–14
 future growth of, 277, 281–282, 285
 potential for, 281
- Nanotechnology and Homeland Security New Weapons for New Wars* (Ratner/Ratner), 103
- Nanotechnology business, start-ups, *see* Nanocompany start-up process
- Nanotechnology Business Alliance, 117
- Nanotechnology center, 78
- Nanotechnology Customer Partnership Meeting, 79
- Nanotechnology research
 banned, 46–47
 regulation of, 44–45
 university list, 141–143
- Nanotechnology Research and Teaching Facility, University of Texas, 125
- Nanotechnology Standards Initiative (IEEE), 284
- Nanotex, 37
- Nanotubes, 17–18, 21, 23. *See also* Carbon nanotubes
- Nanotweezers, 21–22
- Nanowires, 17–18, 21, 23, 38, 215
- Nanox, 199
- Nantero, Inc., 38, 76, 199, 201, 238, 244
- National Accreditation Board of Laboratories, 262
- National Aeronautics and Space Administration (NASA)
 Commercial Technology Division (NCTD), 148
 grant funding, 193
 nanotech research, 146–148
 product development and, 19, 28–29, 55, 64
- National Formulary, 87
- National Industrial Security Program (NISIP), 111
- National Institute for Nanotechnology, 118
- National Institute of Standards and Technology (NIST), 177, 194, 262–264
- National Institutes of Health (NIH), 48, 99, 193
- National Nanofabrication Infrastructure Network, 210
- National Nanotechnology Initiative (NNI)
 development of, 115–116, 119–120
 fund allocation, 140, 146
 as information resource, 176
 review of, 123–126
 structure of, 121–123
 themes of, 122–123
- National Research Council (NRC), 123, 128
- National Science and Engineering Nanotechnology, 176
- National Science and Technology Council (NSTC), 121, 128
- National Science Foundation (NSF), 14, 64, 121, 123–125, 130, 166, 175, 193
- National security, 101
- NEC, 118
- Negotiations
 consolidations, 255–257
 corporate partnering, 242
- Nelson, Lita, 82
- Neophotonics Corp., 201
- Neurodegenerative diseases, 60
- New Drug Application (NDA), 87, 93, 95
- Newspapers/newsletters, as information resource, 178
- NGEN Partners, 202–204
- Niche investment banks, 187
- Noll, Roger, 120
- Non-compete covenants, 150–151
- Noncompetition agreement, 230
- Nondisclosure agreements, 229–230
- Nonfinancial corporations, as financial resource, 195
- Non-merger techniques, 255
- Nonqualified options (NQOs), stock option plans, 157
- North Carolina Citizens Technology Forum, 48–49
- Novald, 199
- Novartis, 259
- Npoint, 37, 192
- Nuclear power, 43, 48
- Nuclear Regulatory Commission, 112
- Nugen, 199
- NVE Corp., 211
- Obviousness doctrine, 220–221
- Office of Biologics Research and Review (OBRR), 97–98
- Office of Biotechnology, FDA, 98, 101
- Office of Combination Products, FDA, 90, 101
- Office of Defense Trade Controls (DTC), 110

- Office of Foreign Assets Control (OFAC), 111
- Office of Homeland Security, 104
- Office of Nanotechnology, FDA, 101, 134
- Office of Science and Technology Policy (OSTP), 121, 125
- 1-D nanomaterials, 17
- Operations
 - customer service, 173
 - key management, 174
 - manufacturing, 172–173
 - research and development, 172
 - sales and marketing, 173
 - venture financing process, 208
- Optical detectors, 169
- Optical tweezers, 22
- Optimag, 272
- Optimism, 133
- Optiva, Inc., 199, 201–202
- Optobionics, 203
- Organic light-emitting diodes (OLEDs), 26
- Organic nanomaterials, 19–20
- Organizational philosophy, 163
- Organizational structure
 - C corporations (C Corps), 153–154, 157, 282
 - limited liability companies (LLCs), 153–154, 282
 - S corporations (S Corps), 153–154
- Outsourcing, business plan, 186–187
- Overture, 200
- Ownership issues, 237, 256–257, 270
- Oxonica Ltd, 202

- Parametric Technology, 200
- Partnering arrangements
 - benefits of, 235–236
 - distribution, 243, 245
 - equity investment, 243–244
 - examples of, 238
 - licensing, 243, 246
 - manufacturing, 243–245
 - motives for, 236–237
 - risk of, 239–240
 - search for partner, 240–243
 - start-up contributions, 241–242
 - success factors, 246–247
 - technology development, 244
- Partnerships, 170, 195
- Patent and Trademark Office (PTO)
 - Customer Partnership Meeting, 213, 220
 - foreign patent applications, 223
 - functions of, 211, 213
 - infringement litigation, 225
 - patent law, 66–68
 - patent system goals, 66
 - reform, 78–79
 - rejection by, 219–223
 - review of nanotechnology patents, 68–77
 - trademark registration, 231–233
- Patent applications
 - claims, 215–219
 - written description, 214–215
- Patent Cooperation Treaty (PCT), 223–224
- Patent law, summary of, 66–68
- Patent pools, 76, 80–82
- Patents
 - applications, *see* Patent applications
 - enforcement of, 226
 - filing process, 212–214, 223–224
 - foreign applications, 223–224
 - importance of, 211–213
 - infringement of, 67, 211, 217, 224–226
 - issuance of, 223
 - licensing, 226
 - litigation, 211, 214, 226–227
 - market segmentation and, 170
 - PTO rejection, response to, 219–223
 - PTO review, *see* Patents, PTO review
 - standardization and, 264–265
- Patents, PTO review
 - broad and overlapping claims, 69–71
 - claims rejection, 69
 - judicial action, 79
 - licensing, government intervention, 79–82
 - number of patents, 71–74
 - process overview of, 68–69
 - transaction costs, 75, 77
- Pay to play provisions, 207
- Peer review process, 194
- Penn State University, 194
- Performance Plastics Products Inc. (3P), 238
- Personnel Exchange Agreement (PEX), 211
- Pesticides, 52, 64
- Pharmacy-in-a-cell, 92–93
- Phoenix Bioscience, 200
- Photolithography, 15–16, 45
- Photonic crystals, 26
- Photovoltaics, 26, 38, 169–170
- Physical Sciences, 192
- Pionetics, 202
- Plutonium, 112
- Polaris Ventures, 203
- Policy analysis, 43–46
- Policy and regulation
 - desirability of nanotechnology, 132–133
 - environmental regulation, 51–64, 133
 - export control, 103–113, 134
 - FDA regulation, 83–102, 134
 - federal funding, 115–130
 - fundamental organization of, 133–134
 - government support and, 135
 - national security, 103–113
 - patent and trademark office (PTO), 65–82, 133–134
 - policymakers, functions of, 132
 - recommendations, 47–49
 - societal and ethical implications, 41–49
- Polychlorinated biphenyls (PCBs), 52, 64
- Polymers, 20–21
- PolyOne, 238
- Porter, Michael, 167, 169
- Positional assembly, 16
- Powerspan, 202
- Power systems, backup, 172

- Precautionary principle, 58–60
 Preferred stock, 206–207, 243, 256
 Premanufacturing notice (PMNs), 53
 Premarket Approval Application (PMA), 87, 94
 Pre-money valuation, 206
 Present value (PV), 184
 President's Council of Advisors on Science and Technology (PCAST), 128–129
 Price-to-earning (P/E) multiple, 183
 Printing, 15
 Private companies, valuation of, 181
 Private equity investors, 197–198
 Private investments, 118
 Private-private mergers, 255
 Process/method claims, patent applications, 216
 Product approval, FDA regulation problems generally, 95–96
 new versions of existing products, 93–94
 new versions of other technologies, 94–95
 Product-by-process claims, patent applications, 216–217
 Product liability, 54
 Professional journals, as information resource, 178
 Professional societies, 99
 Promotions, 173
 PROMT, 213
 Prospectus, 279
 Protein-based nanostructures, 19
 Proteomics, 98
 PsiloQuest, 202
 Public health, 62, 83
 Public Health Service Act, 88
 Public health service agencies, 99
 Public offerings, 207
 Public perception, as influential factor, 170–171
 Public relations, 173
 Pyrograf Products, 253

 Quantomix, 199
 Quantum Dot Corporation, 74, 230
 Quantum dots, 18, 38, 218
 Quantum Solar Energy, 273
 Questech Corp., 201

 Random-access memory (RAM), 25
 Rat studies, 64
 Ratner, Daniel and Mark, 103
 Raytheon, 34
 r-DNA experimentation, 48
 Recombinant DNA Advisory Committee (RAC), 48
 Recombinant DNA technologies, 97, 143
 Recordkeeping, corporate spinoffs, 151
 Redemption preferences, corporate partnering, 243
 Redemption provisions, venture financing criteria, 207
 Referrals, in venture financing, 203

 Regional Center for Nanofabrication
 Manufacturing Education, Pennsylvania State University, 125
 Registration rights, venture capital criteria, 207
 Regulation, as influential factor, 171
 Replication, 19, 30–31, 96
 Research & Development (R&D)
 federal funding, 120–128, 194
 high-risk projects, 194
 local resistance to, 170–171
 operations, in business plan, 172
 Research Corporation Technologies, 202
 Research experience for undergraduates (REU), 124
 Residual value, 185–186
 Revenue growth, 183–184
 Rice University, 143
 Right of first refusal, 208
 Risk disclosure, 171–172
 Roche, 34, 170
 Rocket propellants, 22
 Roco, Mihail, 58
 Rosseter Holdings, 253
 Royalties, licensing, 144

 SAIC, 277
 Sales and marketing, 173
 Sales force, 173
 Sandoz, 259
 Santur, 199
 Sarbanes-Oxley Act of 2002, 271, 276
 Sayre, Phil, Dr., 57
 Scanning electron microscope (SEM), 52
 Scanning tunneling microscope (STM), 21
 Scientific advisory board (SAB), 155–156
 Scientific expertise, FDA regulation
 acquisition problems, 100–101
 emerging technologies, 97–99
 internal training, 102
 nanomaterials, 96–97
 significance of, 97
 Sciperio Inc., 194
 SCISEARCH, 213
 S corporations (S Corps), 153–154
 Securities and Exchange Act of 1933, 270, 278
 Securities and Exchange Commission (SEC), 207, 269–271, 275, 278–280
 Seed round, 189–191
 Self-assembly, 18–19
 Self-replication technology, 45, 48–49
 Semiconductor industry, 24, 34
 Semiconductor manufacturing, 197
 Semiconductor nanocrystals, 18–19, 21, 55, 218
 Semiconductor patents, 68
 Sensicast, 200
 Sensicore, 200, 202, 205
 Sensors, 38, 42, 168
 Service mark protection, 230
 Sevin Rosen Funds, 203
 Sewing Machine Combination, 76

- Shapiro, Carl, 77
- Significant New Use Notice (SNUN), 53
- Significant New Use Rule (SNUR), 53, 63
- Silicon nanocrystals, 64
- Silicon Valley, 196, 200, 255
- Simple nanotechnology
- defined, 22–23
 - market segmentation, 167–168
 - societal and ethical implications of, 41–42
- Single-walled nanotubes (SWNTs), 17–18
- Sionex, 199
- SiWave, 201
- Small Business Administration (SBA), 177
- Small business innovative research (SBIR) grants, 124, 130, 191, 193, 183
- Small business technology transfer (STTR) grants, 124, 191, 193, 283
- Smalley, Richard, 17, 31, 43
- Small Times*, 200
- Societal implications
- First Amendment protection, 46–47
 - immediate action, 42–43
 - legal analysis, 46
 - overview of, 41–42
 - policy analysis, 43–46
- Solar energy, 26
- Solicore, 201
- Solubest, 199
- Somatic cell, 88
- Sources and uses, business plan components
- Southwest NanoTechnologies, 253
- Spectroscopy, 23–24
- Spin-offs
- corporate, 149–151
 - government laboratory, 146–149, 210–211
 - university, 140–145, 210
- Spintronic devices, 24
- Spiritual machines, 42, 44, 132
- Sponsorship, 210
- Standardization
- anticipatory standards, 261–262
 - defining standards, 259–261
 - efforts toward, 262–264
 - importance of, 259–260
 - setting standards, 264–265
- Standard MEMS, Inc., 194
- Standards developing organizations (SDOs), 260–261
- Stanford University, 144, 216
- Starfire Electronic Development and Marketing, Inc., 70
- Starfire Electronics, 216
- Starting a nanotech company
- corporate governance, 154–157
 - corporate spinoff, 149–151
 - employee stock options, 157–158
 - initial intellectual property, 140–151
 - government laboratory spinoff, 146–149, 210–211
 - initial intellectual property, 140–151
 - location, 158–161
 - naming the company, 151–152
 - organizational structure, 152–154
 - stock issuance, 157
 - university spin-off, 140–145, 210
- Start-up companies
- components, of, 35–37, 77
 - funding for, 118–11
 - licensing, 80–82
 - product development, regulation of, 60
- State Department, 110–111
- State funding, 117
- Stevenson-Wydler Technology Innovation Act of 1980, 146
- Stock-for-stock mergers, 255
- Stock issuance, 157
- Stock purchase agreements, 275
- Strategic fit, 274
- Strategic partners, selection process, 240–243
- Strategic Partnership for Research in Nanotechnology (SPRING), 160
- Sublicensing, 143
- Suggestive trademarks, 231
- Sumitomo, 238
- Sun Nanotech, 253
- Superior MicroPowders, 273
- Synergistic effects, 56
- Synfuels Program, 130
- TakaraBio Inc., 170, 245
- Target market, selection factors
- competition, 168
 - Five Forces Model, 169
 - partnerships, 170
 - public perception, 170–171
 - regulation, 171
 - technological development speed, 168
- Technical Barriers to Trade Agreement (TBT), 260–261
- Technological advances, impact of, 94
- Technological progress, impact of, 44–45
- Technology dissemination, 147–148
- Technostart, 247
- Telecommunications industry, 34
- Telesales force, 173
- Terminal values, 185–186
- Terrorism, 104
- Texas Nanotechnology Initiative, 117, 160
- Therafuse, 200
- Thermo Microscopes, 272
- Thin-films, 168
- Thomason Derwent, 213
- Thomson Delphion, 213
- Thomson Research, 178
- 3i, 247
- Tissue engineering, 28, 88, 95, 98–99
- Tissue Proteomics Progra, 99
- Tissue Reference Group, 90
- Titanium dioxide, 55
- Tombstone ad, 279
- Top-down approach, 15, 18
- Toxicity, 54–58

- Toxic Substance and Control Act (TSCA), 53, 61–64
- Toxic tort litigation, 54
- Trademark
 - characteristics of, 230
 - litigation, 233
 - ownership establishment, 230–232
 - utilization of, 232–233
- Trade secrets
 - components of, 227–228
 - consolidations and, 256
 - corporate spinoffs, 150–151
- Trade shows, 173
- Tragedy of the anticommons, 77, 79
- Trailer clauses, 150, 229
- Translume, 200
- Tree diagrams, patent review, 72–74
- TRIPS Agreement, 249
- TSCA Inventory, 53
- Tufts Center for the Study of Drug Development, 99
- 21st Century Nanotechnology Research and Development, 120, 126–128
- 21st Century Nanotechnology Research and Development Act, 47
- 2-D nanomaterials, 17

- UC Berkeley, 24, 217
- UCLA, 24
- Ultrafine particles, health hazards, 54–56, 58
- Underwriters, IPOs, 278
- Unfair competition, 229
- Uniform Trade Secrets Act (UTSA), 228
- United Online, 200
- U.S. Census Bureau, as information resource, 177
- United States Copyright Office, 234
- U.S. Customs Service, 231
- U.S. Foreign Trade Zone, 105
- U.S. law, 61–62
- United States Pharmacopoeia, 87
- United States Treasury Department, 111
- University license agreements
 - price negotiations, 144
 - standard provisions, 145
- University licensing office (OTL), 140, 143
- University of Texas–Dallas, 194
- University spin-offs
 - components of, 140–145
 - intellectual property, generation of, 210
- University technology transfer (OTT) office, 140, 144
- Uranium, 112
- User Facility Agreement (UFA), 211
- User fee, new device applications, 88

- Vaccines, 60, 88
- Valuation
 - consolidations, 256
 - discounted cash flow (DCF), 184–186
 - Discount Rates, 185
 - exogenous variables in, 186
 - implications of, 181–182
 - multiples, 182–184
 - terminal values, 185–186
 - in venture financing process, 206
- VEECO, 37, 272–273
- Venter, Craig, 206
- Venture capital
 - consolidations, 258
 - corporate partnering and, 239, 241
 - investing, 195–199
 - sources of, 77, 149, 189, 203–206
 - top nanotech venture firms, 200–203
- Venture capitalists (VCs)
 - control issues, 237
 - financing criteria, 195
 - functions of, 156, 166, 190
 - industry perceptions, 196
 - voting rights, 208
- Venture Capital Journal, 196
- Venture financing
 - future rounds of, 208
 - terms and conditions, 206–208
 - sources of, 153, 156
 - top nanotech venture firms, 200–203
 - in 2003, 199
- Venture investment, 196–195
- Vesting schedule, stock option plans, 57–158
- Viruses, 19–20
- Voting rights, 208, 243

- Water systems, 172
- Water treatment plants, 64
- Weighted average formula, 207
- Weinbaum, Barry, 166
- Wildavsky, Aaron, 59
- Williams, Stan, 197
- Work For Others (WFO) agreement, 211
- World Trade Organization (WTO), 63
- Wyko Optical Metrology, 273

- Xenotransplantation, 88

- Yahoo!, 158
- Yang, Peidong, Dr., 156

- 0-D nanomaterials, 17
- Zettacore, 201
- Zyvox Corporation, 194

