

## **MICROLITHOGRAPHY**

Science and Technology

**Second Edition** 



© 2007 by Taylor & Francis Group, LLC



#### OPTICAL SCIENCE AND ENGINEERING

Founding Editor
Brian J. Thompson
University of Rochester
Rochester, New York

- Electron and Ion Microscopy and Microanalysis: Principles and Applications, Lawrence E. Murr
- Acousto-Optic Signal Processing: Theory and Implementation, edited by Norman J. Berg and John N. Lee
- 3. Electro-Optic and Acousto-Optic Scanning and Deflection, Milton Gottlieb, Clive L. M. Ireland, and John Martin Ley
- 4. Single-Mode Fiber Optics: Principles and Applications, Luc B. Jeunhomme
- Pulse Code Formats for Fiber Optical Data Communication: Basic Principles and Applications, David J. Morris
- Optical Materials: An Introduction to Selection and Application, Solomon Musikant
- Infrared Methods for Gaseous Measurements: Theory and Practice, edited by Joda Wormhoudt
- Laser Beam Scanning: Opto-Mechanical Devices, Systems, and Data Storage Optics, edited by Gerald F. Marshall
- 9. Opto-Mechanical Systems Design, Paul R. Yoder, Jr.
- Optical Fiber Splices and Connectors: Theory and Methods, Calvin M. Miller with Stephen C. Mettler and Ian A. White
- 11. Laser Spectroscopy and Its Applications, edited by Leon J. Radziemski, Richard W. Solarz, and Jeffrey A. Paisner
- 12. Infrared Optoelectronics: Devices and Applications, William Nunley and J. Scott Bechtel
- Integrated Optical Circuits and Components: Design and Applications, edited by Lynn D. Hutcheson
- 14. Handbook of Molecular Lasers, edited by Peter K. Cheo
- 15. Handbook of Optical Fibers and Cables, Hiroshi Murata
- 16. Acousto-Optics, Adrian Korpel
- 17. Procedures in Applied Optics, John Strong
- 18. Handbook of Solid-State Lasers, edited by Peter K. Cheo.
- 19. Optical Computing: Digital and Symbolic, edited by Raymond Arrathoon
- 20. Laser Applications in Physical Chemistry, edited by D. K. Evans
- Laser-Induced Plasmas and Applications, edited by Leon J. Radziemski and David A. Cremers
- 22. Infrared Technology Fundamentals, Irving J. Spiro and Monroe Schlessinger
- 23. Single-Mode Fiber Optics: Principles and Applications, Second Edition, Revised and Expanded, Luc B. Jeunhomme
- 24. Image Analysis Applications, edited by Rangachar Kasturi and Mohan M. Trivedi
- 25. Photoconductivity: Art, Science, and Technology, N. V. Joshi
- 26. Principles of Optical Circuit Engineering, Mark A. Mentzer
- 27. Lens Design, Milton Laikin



- 28. Optical Components, Systems, and Measurement Techniques, Rajpal S. Sirohi and M. P. Kothiyal
- Electron and Ion Microscopy and Microanalysis: Principles and Applications, Second Edition, Revised and Expanded, Lawrence E. Murr
- 30. Handbook of Infrared Optical Materials, edited by Paul Klocek
- 31. Optical Scanning, edited by Gerald F. Marshall
- Polymers for Lightwave and Integrated Optics: Technology and Applications, edited by Lawrence A. Hornak
- 33. Electro-Optical Displays, edited by Mohammad A. Karim
- 34. Mathematical Morphology in Image Processing, edited by Edward R. Dougherty
- 35. Opto-Mechanical Systems Design: Second Edition, Revised and Expanded, Paul R. Yoder, Jr.
- 36. Polarized Light: Fundamentals and Applications, Edward Collett
- 37. Rare Earth Doped Fiber Lasers and Amplifiers, edited by Michel J. F. Digonnet
- 38. Speckle Metrology, edited by Rajpal S. Sirohi
- 39. Organic Photoreceptors for Imaging Systems, Paul M. Borsenberger and David S. Weiss
- 40. Photonic Switching and Interconnects, edited by Abdellatif Marrakchi
- 41. Design and Fabrication of Acousto-Optic Devices, edited by Akis P. Goutzoulis and Dennis R. Pape
- 42. Digital Image Processing Methods, edited by Edward R. Dougherty
- 43. Visual Science and Engineering: Models and Applications, edited by D. H. Kelly
- 44. Handbook of Lens Design, Daniel Malacara and Zacarias Malacara
- 45. Photonic Devices and Systems, edited by Robert G. Hunsberger
- 46. Infrared Technology Fundamentals: Second Edition, Revised and Expanded, edited by Monroe Schlessinger
- 47. Spatial Light Modulator Technology: Materials, Devices, and Applications, edited by Uzi Efron
- 48. Lens Design: Second Edition, Revised and Expanded, Milton Laikin
- 49. Thin Films for Optical Systems, edited by Francoise R. Flory
- 50. Tunable Laser Applications, edited by F. J. Duarte
- 51. Acousto-Optic Signal Processing: Theory and Implementation, Second Edition, edited by Norman J. Berg and John M. Pellegrino
- 52. Handbook of Nonlinear Optics, Richard L. Sutherland
- 53. Handbook of Optical Fibers and Cables: Second Edition, Hiroshi Murata
- 54. Optical Storage and Retrieval: Memory, Neural Networks, and Fractals, edited by Francis T. S. Yu and Suganda Jutamulia
- 55. Devices for Optoelectronics, Wallace B. Leigh
- 56. Practical Design and Production of Optical Thin Films, Ronald R. Willey
- 57. Acousto-Optics: Second Edition, Adrian Korpel
- 58. Diffraction Gratings and Applications, Erwin G. Loewen and Evgeny Popov
- 59. Organic Photoreceptors for Xerography, Paul M. Borsenberger and David S. Weiss
- 60. Characterization Techniques and Tabulations for Organic Nonlinear Optical Materials, edited by Mark G. Kuzyk and Carl W. Dirk
- 61. Interferogram Analysis for Optical Testing, Daniel Malacara, Manuel Servin, and Zacarias Malacara
- 62. Computational Modeling of Vision: The Role of Combination, William R. Uttal, Ramakrishna Kakarala, Spiram Dayanand, Thomas Shepherd, Jagadeesh Kalki, Charles F. Lunskis, Jr., and Ning Liu
- 63. Microoptics Technology: Fabrication and Applications of Lens Arrays and Devices, Nicholas Borrelli
- 64. Visual Information Representation, Communication, and Image Processing, edited by Chang Wen Chen and Ya-Qin Zhang
- 65. Optical Methods of Measurement, Rajpal S. Sirohi and F. S. Chau



- Integrated Optical Circuits and Components: Design and Applications, edited by Edmond J. Murphy
- 67. Adaptive Optics Engineering Handbook, edited by Robert K. Tyson
- 68. Entropy and Information Optics, Francis T. S. Yu
- 69. Computational Methods for Electromagnetic and Optical Systems, John M. Jarem and Partha P. Banerjee
- 70. Laser Beam Shaping, Fred M. Dickey and Scott C. Holswade
- 71. Rare-Earth-Doped Fiber Lasers and Amplifiers: Second Edition, Revised and Expanded, edited by Michel J. F. Digonnet
- 72. Lens Design: Third Edition, Revised and Expanded, Milton Laikin
- 73. Handbook of Optical Engineering, edited by Daniel Malacara and Brian J. Thompson
- Handbook of Imaging Materials: Second Edition, Revised and Expanded, edited by Arthur S. Diamond and David S. Weiss
- 75. Handbook of Image Quality: Characterization and Prediction, Brian W. Keelan
- 76. Fiber Optic Sensors, edited by Francis T. S. Yu and Shizhuo Yin
- 77. Optical Switching/Networking and Computing for Multimedia Systems, edited by Mohsen Guizani and Abdella Battou
- Image Recognition and Classification: Algorithms, Systems, and Applications, edited by Bahram Javidi
- 79. Practical Design and Production of Optical Thin Films: Second Edition, Revised and Expanded, Ronald R. Willey
- 80. Ultrafast Lasers: Technology and Applications, edited by Martin E. Fermann, Almantas Galvanauskas, and Gregg Sucha
- Light Propagation in Periodic Media: Differential Theory and Design, Michel Nevière and Evgeny Popov
- Handbook of Nonlinear Optics, Second Edition, Revised and Expanded, Richard L. Sutherland
- 83. Polarized Light: Second Edition, Revised and Expanded, Dennis Goldstein
- 84. Optical Remote Sensing: Science and Technology, Walter Egan
- 85. Handbook of Optical Design: Second Edition, Daniel Malacara and Zacarias Malacara
- 86. Nonlinear Optics: Theory, Numerical Modeling, and Applications, Partha P. Banerjee
- 87. Semiconductor and Metal Nanocrystals: Synthesis and Electronic and Optical Properties, edited by *Victor I. Klimov*
- 88. High-Performance Backbone Network Technology, edited by Naoaki Yamanaka
- 89. Semiconductor Laser Fundamentals, Toshiaki Suhara
- 90. Handbook of Optical and Laser Scanning, edited by Gerald F. Marshall
- 91. Organic Light-Emitting Diodes: Principles, Characteristics, and Processes, Jan Kalinowski
- 92. Micro-Optomechatronics, Hiroshi Hosaka, Yoshifada Katagiri, Terunao Hirota, and Kiyoshi Itao
- 93. Microoptics Technology: Second Edition, Nicholas F. Borrelli
- 94. Organic Electroluminescence, edited by Zakya Kafafi
- 95. Engineering Thin Films and Nanostructures with Ion Beams, Emile Knystautas
- Interferogram Analysis for Optical Testing, Second Edition, Daniel Malacara, Manuel Sercin, and Zacarias Malacara
- 97. Laser Remote Sensing, edited by Takashi Fujii and Tetsuo Fukuchi
- 98. Passive Micro-Optical Alignment Methods, edited by Robert A. Boudreau and Sharon M. Boudreau
- Organic Photovoltaics: Mechanism, Materials, and Devices, edited by Sam-Shajing Sun and Niyazi Serdar Saraeftei
- 100. Handbook of Optical Interconnects, edited by Shigeru Kawai
- 101. GMPLS Technologies: Broadband Backbone Networks and Systems, Naoaki Yamanaka, Kohei Shiomoto, and Eiji Oki



- 102, Laser Beam Shaping Applications, edited by Fred M. Dickey, Scott C. Holswade and David L. Shealy
- 103. Electromagnetic Theory and Applications for Photonic Crystals, Kiyotoshi Yasumoto
- 104. Physics of Optoelectronics, Michael A. Parker
- 105. Opto-Mechanical Systems Design: Third Edition, Paul R. Yoder, Jr.
- 106. Color Desktop Printer Technology, edited by Mitchell Rosen and Noboru Ohta
- 107. Laser Safety Management, Ken Barat
- 108. Optics in Magnetic Multilayers and Nanostructures, Štefan Višňovský
- 109. Optical Inspection of Microsystems, edited by Wolfgang Osten
- 110, Applied Microphotonics, edited by Wes R. Jamroz, Roman Kruzelecky, and Emile I. Haddad
- 111. Organic Light-Emitting Materials and Devices, edited by Zhigang Li and Hong Meng
- 112, Silicon Nanoelectronics, edited by Shunri Oda and David Ferry
- 113, Image Sensors and Signal Processor for Digital Still Cameras,

  Junichi Nakamura
- 114. Encyclopedic Handbook of Integrated Circuits, edited by Kenichi Iga and Yasuo Kokubun
- 115. Quantum Communications and Cryptography, edited by Alexander V. Sergienko
- 116. Optical Code Division Multiple Access: Fundamentals and Applications, edited by Paul R. Prucnal
- 117. Polymer Fiber Optics: Materials, Physics, and Applications, Mark G. Kuzyk
- 118. Smart Biosensor Technology, edited by George K. Knopf and Amarjeet S. Bassi
- 119. Solid-State Lasers and Applications, edited by Alphan Sennaroglu
- 120. Optical Waveguides: From Theory to Applied Technologies, edited by Maria L. Calvo and Vasudevan Lakshiminarayanan
- 121. Gas Lasers, edited by Masamori Endo and Robert F. Walker
- 122. Lens Design, Fourth Edition, Milton Laikin
- 123. Photonics: Principles and Practices, Abdul Al-Azzawi
- 124. Microwave Photonics, edited by Chi H. Lee
- 125. Physical Properties and Data of Optical Materials, *Moriaki Wakaki, Keiei Kudo,* and Takehisa Shibuya
- 126, Microlithography: Science and Technology, Second Edition, edited by Kazuaki Suzuki and Bruce W. Smith

# DOCKET

## Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## **Real-Time Litigation Alerts**



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## **Advanced Docket Research**



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## **Analytics At Your Fingertips**



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

### API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

#### **LAW FIRMS**

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

#### **FINANCIAL INSTITUTIONS**

Litigation and bankruptcy checks for companies and debtors.

### **E-DISCOVERY AND LEGAL VENDORS**

Sync your system to PACER to automate legal marketing.

