

Contents

Preface	xi
---------------	----

CHEMICALLY AMPLIFIED RESISTS

1. Chemical Amplification Mechanisms for Microlithography.....	2
E. Reichmanis, F. M. Houlihan, O. Nalamasu, and T. X. Neenan	
2. Synthesis of 4-(<i>tert</i>-Butoxycarbonyl)-2,6-dinitrobenzyl Tosylate: A Potential Generator and Dissolution Inhibitor Solubilizable through Chemical Amplification	25
F. M. Houlihan, E. Chin, O. Nalamasu, and J. M. Kometani	
3. Chemically Amplified Deep-UV Photoresists Based on Acetal-Protected Poly(vinylphenols)	40
Ying Jiang and David R. Bassett	
4. Novel Analytic Method of Photoinduced Acid Generation and Evidence of Photosensitization via Matrix Resin	53
N. Takeyama, Y. Ueda, T. Kusumoto, H. Ueki, and M. Hanabata	
5. Acid-Catalyzed Dehydration: A New Mechanism for Chemically Amplified Lithographic Imaging.....	64
H. Ito, Y. Maekawa, R. Sooriyakumaran, and E. A. Mash	
6. An Alkaline-Developable Positive Resist Based on Silylated Polyhydroxystyrene for KrF Excimer Laser Lithography	88
Eiichi Kobayashi, Makoto Murata, Mikio Yamachika, Yasutaka Kobayashi, Yoshiji Yumoto, and Takao Miura	
7. A Test for Correlation between Residual Solvent and Rates of <i>N</i>-Methylpyrrolidone Absorption by Polymer Films.....	101
W. D. Hinsberg, S. A. MacDonald, C. D. Snyder, H. Ito, and R. D. Allen	

8. **Dissolution Rates of Copolymers Based on 4-Hydroxystyrene and Styrene** 111
C.-P. Lei, T. Long, S. K. Obendorf, and F. Rodriguez
9. **Synthesis and Polymerizations of *N*-(*tert*-Butoxy)maleimide and Application of Its Polymers as a Chemical Amplification Resist**..... 124
Kwang-Duk Ahn and Deok-II Koo
10. **Acid-Sensitive Pyrimidine Polymers for Chemical Amplification Resists** 142
Yoshiaki Inaki, Nobuo Matsumura, and Kiichi Takemoto
11. **Methacrylate Terpolymer Approach in the Design of a Family of Chemically Amplified Positive Resists** 165
R. D. Allen, G. M. Wallraff, W. D. Hinsberg,
L. L. Simpson, and R. R. Kunz

TOP-SURFACE IMAGING AND
DRY DEVELOPMENT RESISTS

12. **Surface-Imaging Resists Using Photogenerated Acid-Catalyzed SiO₂ Formation by Chemical Vapor Deposition**..... 180
Masamitsu Shirai and Masahiro Tsunooka
13. **Polysilphenylenesiloxane Resist with Three-Dimensional Structure**..... 194
K. Watanabe, E. Yano, T. Namiki, and Y. Yoneda
14. **Top-Surface Imaging Using Selective Electroless Metallization of Patterned Monolayer Films**..... 210
J. M. Calvert, W. J. Dressick, C. S. Dulcey, M. S. Chen,
J. H. Georger, D. A. Stenger, T. S. Koloski, and
G. S. Calabrese
15. **Langmuir-Blodgett Deposition To Evaluate Dissolution Behavior of Multicomponent Resists** 220
V. Rao, W. D. Hinsberg, C. W. Frank, and R. F. W. Pease
16. **Photochemical Control of a Morphology and Solubility by Interfacial Contact with Siloxanes and Phenol-Formaldehyde Polymeric Photoresists**
James R. Sheats

ELECTRON-BEAM, X-RAY, AND PHOTORESISTS

17. **Advances in the Chemistry of Resists for Ionizing Radiation**..... 252
Ralph Dammel
18. **Out-of-Plane Expansion Measurements in Polyimide Films**..... 282
Michael T. Pottiger and John C. Coburn
19. **Radiation-Induced Modifications of Allylamino-Substituted Polyphosphazenes** 293
M. F. Welker, H. R. Allcock, G. L. Grune, R. T. Chern, and V. T. Stannett
20. **Synthesis of Perfluorinated Polyimides for Optical Applications** 304
Shinji Ando, Tohru Matsuura, and Shigekuni Sasaki
21. **Charged Species in σ -Conjugated Polysilanes as Studied by Absorption Spectroscopy with Low-Temperature Matrices**
K. Ushida, A. Kira, S. Tagawa, Y. Yoshida, and H. Shibata
22. **Acid-Sensitive Phenol-Formaldehyde Polymeric Resists**..... 333
W. Brunsvold, W. Conley, W. Montgomery, and W. Moreau
23. **Superiority of Bis(perfluorophenyl) Azides over Nonfluorinated Analogues as Cross-Linkers in Polystyrene-Based Deep-UV Resists**
Sui Xiong Cai, M. N. Wybourne, and John F. W. Keana
24. **New Photoresponsive Polymers Bearing Norbornadiene Moiety: Synthesis by Selective Cationic Polymerization of 2-(3-Phenyl-2,5-norbornadiene-2-carbonyloxy)ethyl Vinyl Ether and Photochemical Reaction of the Resulting Polymers**...
T. Nishikubo, A. Kameyama, K. Kishi, and C. Hijikata
25. **Photoinitiated Thermolysis of Poly(5-norbornene 2,3-dicarboxylates): A Way to Polyconjugated Systems and Photoresists**..... 370
Ernst Zenkl, Michael Schimetta, and Franz Stelzer

POLYIMIDES AND DIELECTRIC POLYMERS

26. **Recent Progress of the Application of Polyimides to Microelectronics** 380
Daisuke Makino
27. **Base-Catalyzed Cyclization of *ortho*-Aromatic Amide Alkyl Esters: A Novel Approach to Chemical Imidization**..... 403
W. Volksen, T. Pascal, J. W. Labadie, and M. I. Sanchez
28. **Base-Catalyzed Photosensitive Polyimide** 417
D. R. McKean, G. M. Wallraff, W. Volksen, N. P. Hacker, M. I. Sanchez, and J. W. Labadie
29. **Novel Cross-Linking Reagents Based on 3,3-Dimethyl-1-phenylenetriazine**..... 428
Aldrich N. K. Lau and Lanchi P. Vo
30. **Preparation of Novel Photosensitive Polyimide Systems via Long-Lived Active Intermediates**..... 440
Takahi Yamashita and Kazuyuki Horie
31. **Photoregulation of Liquid-Crystalline Orientation by Anisotropic Photochromism of Surface Azobenzenes** 453
Yuji Kawanishi, Takashi Tamaki, and Kunihiro Ichimura
32. **Factors Affecting the Stability of Polypyrrole Films at Higher Temperatures** 466
V.-T. Truong and B. C. Ennis
33. **Intrinsic and Thermal Stress in Polyimide Thin Films** 482
M. Ree and D. P. Kirby
34. **Fluorinated, Soluble Polyimides with High Glass-Transition Temperatures Based on a New, Rigid, Pentacyclic Dianhydride: 12,14-Diphenyl-12,14-bis(trifluoromethyl)-12*H*,14*H*-5,7-dioxapentacene-2,3,9,10-tetracarboxylic Dianhydride** 494
Brian C. Auman and Swiatoslaw Trofimenko
35. **Processable Fluorinated Acrylic Resins with Low Dielectric Constants**..... 507
Henry S.-W. Hu and James R. Griffith

36. Enhanced Processing of Poly(tetrafluoroethylene) for Microelectronics Applications	517
Charles R. Davis and Frank D. Egitto	
37. Synthesis and Characterization of New Poly(arylene ether oxadiazoles)	526
Frank W. Mercer, Chris Coffin, and David W. Duff	
38. Microstructural Characterization of Thin Polyimide Films by Positron Lifetime Spectroscopy	535
A. Eftekhari, A. K. St. Clair, D. M. Stoakley, Danny R. Sprinkle, and J. J. Singh	
39. Fluorinated Poly(arylene ethers) with Low Dielectric Constants	546
Frank W. Mercer, David W. Duff, Timothy D. Goodman, and Janusz B. Wojtowicz	

INDEXES

Author Index	556
Affiliation Index	557
Subject Index	558