MATERIALS RESEARCH SOCIETY
SYMPOSIUM PROCEEDINGS VOLUME 961

Nanostructured and Patterned Materials for Information Storage

November 27 – December 1, 2006
Boston, Massachusetts, USA

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
www.proceedings.com

ISBN: 978-1-60423-413-8

Some format issues inherent in the e-media version may also appear in this print version.

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press
32 Avenue of the Americas, New York, NY 10013-2473, USA

www.cambridge.org

Materials Research Society
506 Keystone Drive, Warrendale, PA 15086
http://www.mrs.org

©Materials Research Society 2007

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2007

CODEN: MRSPDH

ISBN: 978-1-60423-413-8

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-part Internet Web sites referred to in this publication and does not guarantee that any content on such Web sites is, or will remain, accurate or appropriate.

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Novel Anionic Photoacid Generators (PAGs) and Photoresists for sub 50 nm Patterning by EUVL and EBL 1
M. Wang, C. T. Lee, C. L. Henderson, W. Yueh, J. M. Roberts, K. E. Gonsalves

Photoimaging Materials Based on Base-Amplifying Silicone Resins Having Phenylsulfonylethyl Groups 8
S. Inoue, K. Arimitsu, T. Gunji, Y. Abe, K. Ichimura

GMR in Excess of 10% at Room Temperature and Low Magnetic Fields in 14
D. K. Pandya, P. Gupta, S. C. Kashyap, S. Chaudhary

Directed Self-Assembly of Thin Block Copolymer Films under Controlled Atmosphere 20
S. Kim, R. M. Briber, A. Karim, R. L. Jones, H. C. Kim

Nanostructural Evolution in Non-Epitaxial Growth of Thin Films 26
M. Hu, S. Noda, H. Komiyama

Quantum-Cross Tunneling Junction for High Density Memory 32
H. Kaiju, K. Kondo, A. Ishibashi

Replication of Grating-Based Optically Variable Devices in Polypropylene 38
P. W. Leech

Sequential Stretching Lithography 44
H. Lin, O. V. Lima, L. Tan, Z. Li, J. Li

Nanoelectrode Lithography 50
A. Yokoo, H. Namatsu, M. Oda

Tailoring Microdomain Orientation in Block Copolymer Thin Films for Lithographic Application 58
H. Yoshida, H. Kitano, S. Akasaka, T. Inoue, M. Taknaka, H. Hasegawa, H. Nagano

Room-Temperature Nanoimprint Lithography 70
K. I. Nakamatsu, S. Matsui

Template Fabrication Challenges for Patterned Media 85
D. Resnick, G. Schmid, M. Miller, G. Doyle, C. Jones, D. Labrake

Fabrication of Tin Loaded Resorcinol Formaldehyde Aerogel Spheres for Extreme Ultraviolet Source Emission 95
R. R. Paguio, A. Nikroo, C. A. Frederick, J. F. Hund, M. Thi

Formation and Characterization of Striped Nano-Channel Structure on the Functional Oxide Thin Film 102
M. Kasahara, A. Matsuda, Y. Akita, W. Hara, K. Kobayashi, K. Kobayashi, T. Suzuki, M. Yoshimots

Impact of Planarization Sheet Addition on Full Wafer Printing Uniformity 107
T. Leveder, S. Landis, L. Davoust, N. Chaix

Massively Parallel Scanning Probes Microscope with Digital Holographic Readout 113
L. Sache, H. Bleuler

Memory Effects in Manganese Perovskites. Experiment and Theory 119
N. Noginova, J. McClure, V. Gavrilenko, D. Novikov

Development of 3-D Magnetic Nano-Arrays by Electrodeposition into Mesoporous Silica Films 126
J. Manning, R. Campbell, M. G. Bakker, X. Li, D. R. Lee, J. Wang

Fabrication of Magnetic Nanostructures for MRAM using Electron Beam and Focused Ion Beam Exposure of HSQ 132
C. Chen, M. J. Cabral, R. Hull, L. R. Harriott

Measurement of Arrays of Dots Produced by Electron-Beam Lithography 149
P. C. Hoyle, I. Laidler

A Nanodamascene Process to be used as a Building Block for Nanodevices 161
C. Dubuc, J. Beauvais, D. Drouin

Application of Novel Base Amplifiers with 3-Nitropentan-2-yl Group to Photoreactive Materials 167
K. Arimitsu, Y. Ito, T. Gunji, Y. Abe, K. Ichimura

Ab Initio Investigation of a CoFeB/MgO/CoFeB Interface 172
H. S. Domingos, J. J. Martins

Nanoline Templating of Metals and the Underlying Surface Processes 177
J. H. G. Owen, K. Miki

Process Integration of Composite High-k Tunneling Dielectric for Nanocrystal Based Carbon Nanotube Memory 183
U. Ganguly, T. H. Hou, E. C. Kan

Nanofabrications for Information Technology 189
K. Choi

Development of Block Co-Polymers as Self-Assembling Templates for Patterned Media 194
V. Warke, M. L. Curry, M. G. Bakker, K. Hong, J. Mays, P. Britt, X. Li, J. Wang

Grain Size Refinement in Cu Bottom Lead in CPP GMR Stack 200
Z. R. Tadisina, S. Gupta, C. Papusoi, H. Fujiwara, R. Morris, G. Thompson

Observation of $Ge_2Sb_2Te_5$ Thin Film Phase Transition Behavior According to the Number of Cycles Using Transmission Electron Microscope and Scanning Probe Microscope 206
H. Kim, S. Choi, S. Kang, K. Oh, S. Kweon

Nonvolatile Two-Terminal Molecular Memory 213
J. Snodgrass, G. Kennedy, W. N. Mei, R. Sabirianov

Supramolecular Self-Assemblies as High-Density Data-Storage Media 219
N. Wintjes, M. Wahl, A. Kiebele, M. Stohr, S. Schintke, H. Spillman, H. J. Guntherodt, L. Gade, D. Bonifazi, F. Cheng, F. Diederich, T. Jung

Modeling Evaporation Driven Self-Assembly Systems for Magnetic Storage Arrays 224
J. J. Dyreby, G. F. Nellis, K. T. Turner

Nanopatterning and Nanomachining with Table-Top Extreme Ultraviolet Lasers 230
M. C. Marconi, P. W. Wachulak, M. G. Capeluto, G. Vaschenko, H. Bravo, C. S. Menoni, J. Rocca, E. H. Anderson, W. Chao, D. Attwood, O. Hemberg, B. Frazer, S. Bloom

Novel Methods to Reduce Pattern Size and Pitch for Data Storage Using Electron Beam Writing 236
Z. Lu, A. N. Cartwright

Annealing Study of (Co/Pd) N Magnetic Multilayers for Applications in Bit-Patterned Magnetic Recording Media 242
J. Rantschler, S. Zhang, T. R. Lee, D. Smith, D. Weller, S. Khizroev, D. Litvinov

Author Index