

The Electrochemical Society

Copper Interconnects, New Contact and Barrier Metallurgies/Structures, and Low-k Interlevel Dielectrics III

at the 208th ECS Meeting

ECS Transactions Volume 1 No.11

October 16-21, 2005
Los Angeles, California, USA

Printed from e-media with permission by:

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

ISBN: 1-56677-499-3

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

Copyright 2006 by The Electrochemical Society, Inc.
All rights reserved.

This book has been registered with Copyright Clearance Center, Inc.
For further information, please contact the Copyright Clearance Center,
Salem, Massachusetts.

Published by:
The Electrochemical Society, Inc.
65 South Main Street
Pennington, New Jersey 08534-2839, USA
Telephone 609.737.1902
Fax 609.737.2743
e-mail: ecs@electrochem.org
Web: www.electrochem.org

ISBN 1-56677-499-3

Printed in the United States of America

ECS Transactions, Volume 1, Issue 11
Copper Interconnects, New Contact and Barrier
Metallurgies/Structures, and Low-*k* Inter-level Dielectrics III

Table of Contents

| | |
|---|-----|
| Preface | |
| The Evolution of Surface Roughness of Copper Electrodeposition Directly on Ultra-Thin Air Exposed TaN Layers <i>N. Lay and D. Duquette</i> | 1 |
| Electroless Plated CoWB and COWPB Films for Copper Cap Applications <i>V. Mathew, L. Michaelson, S. Garcia, E. Acosta, D. Werho, R. Gregory, Z. Jiang, and K. Kim</i> | 11 |
| Prediction of Microstructure Evolution of Electroplated Copper Films <i>P. Freundlich</i> | 19 |
| <i>In Situ</i> Observation by AFM of the Morphology of Copper Metallization during Electrodeposition <i>M. Breathnach, S. Ahmed, S. Nakahara, and D. N. Buckley</i> | 25 |
| Electrical Properties of Organic and Silicon Carbide Etch Stop Layers in Copper/Porous MSQ Structures <i>G. C. Smith, R. McGowan, S. Hosali, L. Smith, and K. Pfeifer</i> | 41 |
| The Investigation on the Electrical Properties of a-SiCO:H as a Diffusion Barrier to Copper <i>H. Kim and J. Heo</i> | 51 |
| Fabrication of the Electroless NiMoB Films as a Diffusion Barrier Layer on the Low- <i>k</i> Substrate <i>M. Yoshino, T. Masuda, S. Wakatsuki, J. Sasano, I. Matsuda, Y. Shacham-Diamand, and T. Osaka</i> | 57 |
| Copper Electrodeposition on Osmium: A Potential Barrier for Damascene Processing <i>D. Josell, C. A. Witt, and T. Moffat</i> | 69 |
| Electromigration in sub-micron Copper Interconnects in Low- <i>k</i> Dielectrics <i>B. Agarwala, K. Chanda, H. S. Rathore, D. Nguyen, C. Hu, P. Mclaughlin, J. Demarest, L. Clevenger, and C. Yang</i> | 77 |
| Stress Evolution in Electrodeposited Copper Metallization during Room-Temperature Aging <i>T. Chowdhury, S. Ahmed, D. N. Buckley, M. Laugier, S. Nakahara, and C. Heffernan</i> | 93 |
| Degradation of Cu/Ta-N/Ta/Low- <i>k</i> Structure via Outgassing of Low- <i>k</i> Dielectrics <i>J. Chen, C. Chang, S. JangJian, and Y. Lai</i> | 105 |

| | |
|---|-----|
| Investigating the Role of Stress in SOG-filled Shallow-Trench-Isolation Structures of sub-70 nm Device <i>A. Das, A. Klipp, H. Sperlich, and R. Nitsche</i> | 117 |
| Development of Electrochemical Mechanical Polishing for Advanced Copper Planarization <i>R. Jia, Y. Wang, Z. Wang, S. Tsai, J. Diao, D. Mao, L. Karuppiah, and L. Chen</i> | 125 |
| AirGaps for Ultra Low- <i>k</i> Interconnects Fabricated with Hardened Sacrificial Polymer <i>P. A. Kohl, S. Park, J. Krotine, and S. Allen</i> | 135 |
| Fabrication of Deep Sub-lithographic Al-Based Nanointerconnects Utilizing a Wet Chemical Hard Mask Trim Process <i>M. Engelhardt, G. Steinlesberger, and U. Kirchner</i> | 149 |
| Electrografting, A Unique Wet Technology for Seed and Direct Plating in Copper Metallization <i>J. Gonzalez, F. Raynal, H. Monchoix, A. Ben Hamida, J. Daviot, P. Rabinzohn, and C. Bureau</i> | 155 |
| Low Temperature ALD MoN for Applications in Nanoscale Devices <i>W. Zeng, X. Wang, S. H. Meiere, and E. Eisenbraun</i> | 163 |
| Control of Edge Shape, Sidewall Profile, and Sidewall Roughness of the Plasma Etched Copper <i>Y. Kuo and G. Liu</i> | 169 |
| FTIR Study of Porous Low Dielectric Constant SiOC Film under Various Post-Deposition Curing Conditions <i>M. D. Sardo, A. Lagha, A. Humbert, M. Desbois, and N. Laurent</i> | 177 |
| Author Index | 185 |