

---

# Chemical Mechanical Polishing 10

---

## Editors:

### **G. Banerjee**

Air Products and Chemicals, Inc.  
Gilbert, Arizona, USA

### **Y. Obeng**

National Institute of Standards and Technology  
Gaithersburg, Maryland, USA

### **V. Desai**

New Mexico State University  
Las Cruces, New Mexico, USA

### **K. Sundaram**

University of Central Florida  
Orlando, Florida, USA

## Sponsoring Division:



**Dielectric Science & Technology**



Published by

**The Electrochemical Society**

65 South Main Street, Building D  
Pennington, NJ 08534-2839, USA

tel 609 737 1902

fax 609 737 2743

[www.electrochem.org](http://www.electrochem.org)

**ecstransactions**™

**Vol. 19 No. 7**

---

Copyright 2009 by The Electrochemical Society.  
All rights reserved.

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

Published by:

The Electrochemical Society  
65 South Main Street  
Pennington, New Jersey 08534-2839, USA

Telephone 609.737.1902  
Fax 609.737.2743  
e-mail: [ecs@electrochem.org](mailto:ecs@electrochem.org)  
Web: [www.electrochem.org](http://www.electrochem.org)

ISSN 1938-6737 (online)  
ISSN 1938-5862 (print)

Printed in the United States of America.

---

## Table of Contents

*Preface* *iii*

### **Chapter 1** **Opening and Plenary Session**

Milestones in a Quarter Century of CMP - Plenary 3  
*M. A. Fury*

### **Chapter 2** **Process Development**

Potential-pH Diagrams of Copper for the Planarization Slurries with Different 15  
Complexing Agents  
*S. Aksu*

Effect of Copper CMP Slurry Chemistry on the Rate of Agglomeration of 25  
Alumina Particles  
*N. Brahma, M. Chan and J. Talbot*

Effect of KIO<sub>3</sub> on Electrochemical Mechanical Removal of Ta/TaN Films 31  
*R. Govindarajan, N. Venkataraman and S. Raghavan*

### **Chapter 3** **Process Optimization**

CMP For Direct Wafer Bonding of Hermetically Sealed Cavity Structures 41  
*R. L. Rhoades and R. Danzl*

Effect of Ceria Abrasives on Planarization Efficiency in STI CMP Process 51  
*B. Park, Y. Kim, H. Kim, H. Jeong and D. Dornfeld*

Characterization of Dressing Behaviors and Optimization Technique in Chemical 61  
Mechanical Polishing  
*K. Chen and H. Young*

CMP Process for Phase Change Materials	73
<i>F. Liu, C. Ge, K. Xu, M. Ye, Y. Wang, Y. Chen, S. Xia, A. Rosenbusch, A. Duboust, W. Tu and L. Karupiah</i>	
<b>Chapter 4</b>	
<b>Post CMP Cleaning</b>	
Post-CMP Cleaning of Copper/Hydrophobic Low-k Dielectric Films	83
<i>Y. Chen, S. Ko, K. Xu, Y. Wang, W. Tu and L. Karupiah</i>	
NIR Monitoring of CMP Slurries and Post-CMP Cleaning Solutions	91
<i>E. Shalyt, G. Liang, G. Lu and P. Bratin</i>	
Reduction of Scratch on Brush Scrubbing in Post CMP Cleaning by Analyzing Contact Kinetics on Ultra Low-k Dielectric	103
<i>X. Gu, T. Nemoto, A. Teramoto, T. Ito, S. Sugawa and T. Ohmi</i>	
Optimization of Post-CMP Ultrasonic Cleaning Parameters By Taguchi DOE	111
<i>R. Nagarajan and V. Rahul</i>	
Challenges in Post CMP Cleaning for Advanced Technology Nodes	127
<i>D. Tamboli, M. Rao and G. Banerjee</i>	
Author Index	135