February 23 - 25, 2005

Marriott Hotel
Fremont, CA

CMP-MIC Catalog No.
05 IMIC - 1000P

2005
PROCEEDINGS
NINTH INTERNATIONAL
CHEMICAL-MECHANICAL PLANARIZATION
FOR
ULSI MULTILEVEL INTERCONNECTION CONFERENCE (CMP-MIC)

A SPECIALTY CONFERENCE OF

2005 MICROELECTRONICS INSTITUTE FOR INTER-CONNECTION

Library of Congress No.
89-644090

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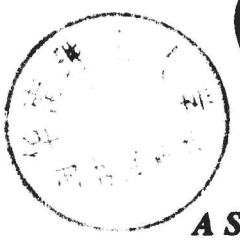

A SPECIALTY CONFERENCE OF

2005 MICROELECTRONICS 1μm INTERCONNECTION ON-CHIP CONNECTION

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TENTH INTERNATIONAL

CHEMICAL-MECHANICAL POLISH (CMP)

FOR ULSI MULTILEVEL INTERCONNECTION
CONFERENCE PROCEEDINGS

A Specialty Conference of IMIC

Papers have been printed without editing as received from the authors.

All opinions expressed in the Proceedings are those of the authors and are not binding on the CMP Planarization for Multilevel Interconnection Conference organizers.

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CMP-MIC/2005

A Specialty Conference of IMIC

CONFERENCE OBJECTIVES

To assemble researchers and technical support personnel from Industry, Universities and Government Laboratories from around the globe to address all current and future issues related to CHEMICAL-MECHANICAL POLISH (CMP) PLANARIZATION for on-chip ULSI Multilevel Interconnection applications. Topical areas include, but are not restricted to, the following: developments in dielectric and metal CMP processes & control; modeling and simulation theory; CMP process integration for dielectric & metals; contamination and (pre & post) cleaning issues; CMP consumable developments (pads/slurries/etc.); equipment and manufacturing issues; characterization and test; CMP standards developments; alternative global planarization techniques as compared to CMP.

WELCOME STATEMENT FROM THE GENERAL CHAIRMAN

It is my distinct pleasure to extend to you a cordial welcome to the Tenth International CHEMICAL-MECHANICAL POLISH (CMP) for ULSI Multilevel Interconnection Conference held at the Marriott Hotel in Fremont, CA. An outstanding program has been planned consisting of over 95 technical papers (involving some 250 authors) from 32 different semiconductor industries, universities and government laboratories from across the U.S. as well as 4 other countries. I wish to express my sincere appreciation to the 2005 CMP-MIC Executive Committee members for assisting with this program.

Concerning the topic of this conference, there are many challenges and much to be accomplished. For as the density of ULSI circuits continues to increase for decreasing design dimensions, resulting from improved lithography and associated patterning technology, it becomes imperative that a multilevel interconnection system incorporating a global planarization system (like CMP) be employed in order to accomodate the lithography requirements, and to make systems incorporating submicron features a reality. This conference is complimented by another IMIC Specialty conference usually held in the Fall which looked at a number of issues related to the on-chip dielectrics and conductors ('05VMIC) for application in ULSI multilevel interconnection. Low dielectric constant insulating materials, global planarization using CMP and high conductivity metals are some of the most important issues in advancing multilevel interconnection into the next century. In order to maintain our rate of scaling ULSI circuitry in the future, these and other issues must be addressed.

It is anticipated that this conference as well as future VMIC Conferences and IMIC Specialty Conferences will address many of these issues such that workable solutions may be derived.

Again, welcome to CMP-MIC/05.

Thomas E. Wade, Ph.D
General Chairman

CONFERENCE REGISTRATION

2005 CMP-MIC participants may register either in advance or at the door. **For Advance Registration,** your application and payment check or money order must be **received** no later than **February 12, 2005**. Those who register in advance may pick up all conference information (including Proceedings) at the registration desk. Additional registration forms may be obtained by calling the CMP-MIC Conference Secretary at (813) 978-3552. **Applications received without payment will not be honored as advance registration. Also, no confirmation of advance registration receipt will be sent.**

Cancellation: Refunds for cancellations of advance registration will be honored provided the request to cancel are made **in writing and are received no later than February 11, 2005.** No telephone calls will be accepted. All refunds for cancellation will be subject to a $50.00 handling charge. Refunds will be sent after the Conferences.

Registration entitles an attendee admission to all sessions, handouts, coffee breaks, a set of the official Proceedings of the Conference, a box lunch on Wednesday, and the CMP-MIC Luncheon on Friday.

Payment for Advance Conference Registration must be in the form of a check (in US dollars drawn on a US bank), money order, travelers checks or credit cards. Purchase orders can not be accepted.

At-the-Door Registration may be accomplished at the following times:

CMP SHORT COURSE REGISTRATION

Tuesday, Feb. 22.....7:00 a.m.- 3 p.m.

CMP-MIC REGISTRATION

Tuesday, Feb. 22..... 4:00 p.m. - 6:00 p.m.
Wednesday, Feb. 23 .....7:30 a.m. - 12 p.m.
Thursday, Feb. 24.....7:30 a.m. - 12 p.m.
Friday, Feb 25 .....7:30 a.m. - 11 a.m.

CONFERENCE BADGES

All attendees **must wear** their conference badge for admission **to all sessions.** For this meeting, there will be no single day registration option.

TECHNICAL POSTER SECTION

The 2005 CMP-MIC will sponsor a "Technical Poster Section" in an adjacent room to the Lecture Hall. Posters will be on display Wednesday, Thursday and Friday, Feb. 23 - 25 from 9 a.m. until 4 p.m. A four-page extended abstract of each poster paper will be published in the 2005 CMP-MIC Conference Proceedings.

FREMONT MARRIOTT HOTEL

Fremont Marriott Hotel is set at the gateway to Silicon Valley, between the McCarthy Ranch and Pacific Commons office parks, the Fremont Marriott is conveniently located at the southern tip of the San Francisco Bay just north of San Jose. As the only full-service hotel in Fremont, it provides an elegant and accommodating atmosphere, near numerous Bay Area attractions, the Napa Valley and world-renowned high-tech headquarters. Attractions & Landmarks includes the Shoreline Amplitheatre, Great Mall of the Bay Area, Paramounts Great American Theme Park, Compaq Arena - San Jose Sharks, Livermore Valley Wineries, Network Associates Oakland Coliseum, etc.
Parking is free for CMP-MIC hotel guest.

2005 CMP-MIC COMMITTEES

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Peter Burke, LSI LOGIC
Timothy Cale, RPI
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Tao Zhang, JAZZ SEMI

TENTH INTERNATIONAL

C.M.P. PLANARIZATION

FOR ULSI MULTILEVEL INTERCONNECTION

CONFERENCE

February 23 - 25, 2005

Wednesday, February 23, 2005
OPENING SESSION - 8:30 A.M.
Welcoming Remarks
Dr. Thomas E. Wade, Gen. Chmn.
University of South Florida

SESSION I -- 8:30 A.M.

KEYNOTE ADDRESS - Part I

From a Semiconductor Manufacturers' Perspective for Future CMP, Where Should the Following be Targeted:

- **Industry/University R & D Efforts**
- **Government/Consortia Funding**
- **CMP Vendor Developments**

PANEL MODERATOR

Peter Singer
Editor-in-Chief
Semiconductor International

SEMICONDUCTOR IND. PANEL

Laertis Economikos, IBM, Hopewell Jct., NY
Mark Buehler, Intel, Hillsboro, OR
Chris Raeder, AMD, Austin, TX
Pete Beckage, Freescale, Austin, TX
Takeshi Nogami, Sony, Tokyo, JAPAN
Peter Thieme, Infineon, Dresden, GERMANY

A brief Question & Answer period will follow formal presentations.

Coffee Break 10:30 - 10:45 AM

SESSION II - 10:45 A.M. - 12:00 P.M.
VLSI MULTILEVEL INTERCONNECTION
CMP CONSUMABLES - PART I

Chairman: **Dr. Ara Philipossian**
UNIV. Of ARIZONA
Tucson, Arizona

--- POSTER PAPERS ---

SESSION III - 1:00 - 3:00 P.M.
VLSI MULTILEVEL INTERCONNECTION
CMP PROCESS MONITORING & CONTROL

Chairman: **Dr. Norm Gitis**
CENTER FOR TRIBOLOGY
Campbell, California

Coffee Break 3:00 - 3:15 PM

SESSION IV - 3:15 - 5:00 P.M.
VLSI MULTILEVEL INTERCONNECTION
C.M.P. MODELING & SIMULATION - PART I

Chairman: **Dr. Mike Fury**
DUPONT EKC TECH.
Hayward, California

Thursday, February 24, 2005

SESSION V -- 8:00 A.M.
KEYNOTE ADDRESS - Part II
From a Vendor / Marketing Consultants Perspective for Future CMP, Where Should the Future Advancements be Targeted ?

PANEL MODERATOR
Peter Singer
Editor-in-Chief
Semiconductor International

VENDOR / MKT. PANEL

Cathie Markham, VP Tech., Rohm & Haas
Cliff Spiro,VP Res., Cabot Microelectronics
Robert Castallano, Pres., Information Network

A brief Question & Answer Period will follow formal presentations.

Coffee Break - 9:15 A.M. - 9:30 A.M.

SESSION VI - 9:30 A.M. - 12:30 P.M.
VLSI MULTILEVEL INTERCONNECTION
CMP PROCESS CHARACTERIZATION & POST-CLEANING PROCESSES

Chairman **Dr. Mansour Moinpour**
INTEL CORP.
Santa Clara, California

CMP PROCESS CHARACTERIZATION

Thursday Lunch on Your Own
Not Provided by Conference

SESSION VII - 1:15 P.M. - 2:30 P.M.
VLSI MULTILEVEL INTERCONNECTION
DEDICATED TIME FOR CMP
POSTER PAPERS, EXHIBIT VIEWING

SESSION VIII - 2:30 P.M. - 5:45 P.M.
VLSI MULTILEVEL INTERCONNECTION
C.M.P. CONDUCTOR & DIELECTRIC PROCESSES

Chairman: **Dr. David Dornfeld**
UNIVERSITY OF CALIFORNIA
Berkeley, California

CMP CONDUCTOR PROCESSES

--- POSTER PAPERS ---

CMP STI & DIELECTRIC PROCESSES

-- POSTER PAPERS --

-- LATE NEWS PAPER --

Friday, February 25, 2005

SESSION IX - 8:00 A.M. - 9:20 A.M.

VLSI MULTILEVEL INTERCONNECTION

CMP INSTRUMENTATION & HARDWARE

Chairman: **Dr. David Hansen**
NOVELLUS CORP.
San Jose, California

-- POSTER PAPERS --

Coffee Break 9:20 A.M. - 9:35 A.M.

SESSION X - 9:35 A.M. - 12:00 P.M.

VLSI MULTILEVEL INTERCONNECTION

C.M.P. CONSUMABLES Part II

Chairman: **Dr. Paul Feeney**
CABOT MICRO.
Aurora, Illinois

CMP-MIC LUNCHEON - 12:15 - 2:00 P.M.

" CAN SIX SIGMA WORK IN A FAST MOVING CMP INDUSTRY ? "

Cliff Spiro
Vice President for Research & Development
Adam Weisman, VP Operations
Julie Hensel, Director QC
CABOT MICROELECTRONICS CORP.
Aurora, Illinois

SESSION XI - 2:00 P.M. - 4:00 P.M.
VLSI MULTILEVEL INTERCONNECTION
C.M.P. APPLICATIONS & RELIABILITY

Chairman: **Dr. Peter Burke**
LSI Logic
Santa Clara, California

CMP APPLICATIONS

CMP RELIABILITY ISSUES

--- POSTER PAPERS --

TENTH INTERNATIONAL

CHEMICAL-MECHANICAL POLISH (CMP)

FOR

ULSI MULTILEVEL INTERCONNECTION

CONFERENCE

Wednesday, February 23, 2005
8:30 - 10:30 A.M.

KEYNOTE ADDRESS - PART I

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SESSION II

Wednesday, February 23, 2005
10:45 A.M. - 12:00 PM

VLSI MULTILEVEL INTERCONNECTION CMP CONSUMABLES - PART I

Chairman:

Dr. Ara Philipossian
UNIVERSITY OF ARIZONA
Tucson, Arizona