Processing Materials of 3D Interconnects, Damascene, and Electronics Packaging 6

Editors:

K. Kondo
Osaka Prefecture University
Sakai, Osaka, Japan

R. Akolkar
Case Western Reserve University
Cleveland, Ohio, USA

D. P. Barkey
University of New Hampshire
Durham, New Hampshire, USA

W.-P. Dow
National Chung Hsing University
Taichung, Taiwan

M. Hayase
Tokyo Science University
Tokyo, Japan

M. Koyanagi
Tohoku University
Sendai, Japan

S. Mathad
S/C Technology Consulting
Poughkeepsie, New York, USA

P. Ramm
Fraunhofer EMFT
Munich, Germany

F. Roozeboom
Eindhoven University of Technology
Eindhoven, Netherlands

S. Shingubara
Kansai University
Suita, Osaka, Japan

Sponsoring Divisions:

Electronics and Photonics

Dielectric Science & Technology

Electrodeposition

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

ecs transactions ™

Vol. 64, No. 40

Copyright 2015 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
Web: www.electrochem.org

ISSN 1938-6737 (online)
ISSN 1938-5862 (print)
ISSN 2151-2051 (cd-rom)

ISBN 978-1-62332-263-2 (Soft Cover)
ISBN 978-1-60768-620-0 (PDF)

Printed in the United States of America.

ECS Transactions, **Volume 64, Issue 40**
Processing Materials of 3D Interconnects, Damascene, and Electronics Packaging 6

Table of Contents

Preface *iii*

R&D Overview of 3D Integration Technology Using TSV Worldwide and in Japan 1
M. Kada

Electrografted Copper Seed Layer for High Aspect Ratio TSVs Interposer Metallization 9
F. Gaillard, L. Religieux, T. Mourier, C. Ribière, L. Vandroux, D. Suhr, F. Raynal, V. Mevellec

A Study on the Decomposition of SPS and Its Effects on Via Filling Performance 23
R. Kimizuka, H. Toda, T. Eda, K. Kishimoto, Y. Takaya, R. Oh, O. Takai

Role of Cuprous Ion in Copper Electrodeposition Acceleration - a Rotating Ring Disk Study 35
K. Nishimura, S. Matsuura, T. Hayashi, K. Kondo, M. Yokoi, T. Saito, N. Okamoto

Development of Glyoxylic Acid Based Electroless Copper Deposition on Ruthenium 41
F. Inoue, H. Philipsen, M. van der Veen, S. Van Huylenbroeck, S. Armini, H. Struyf, S. Shingubara, T. Tanaka

Cu Displacement Plating on Electroless Plated CoWB Layer on SiO_2 and Its Adhesion Property 57
K. Ohta, F. Inoue, T. Shimizu, S. Shingubara

Glyoxylic Acid as Reducing Agent for Electroless Copper Deposition on Cobalt Liner 63
F. Inoue, H. Philipsen, M. van der Veen, S. Van Huylenbroeck, S. Armini, H. Struyf, S. Shingubara, T. Tanaka

Stability Evaluation of Non-Agglomerated Pd Nanoparticle Catalyst Dispersion for Electroless Deposition 77
N. Nakamura, J. Taniuchi, T. Sone, K. Sasaki, F. Inoue, T. Shimizu, S. Shingubara

Barrier Metal Slurry for Low Defect Copper Damascene Chemical Mechanical Polishing 85
H. Kim, K. Seo, J. Moon, H. Kim, H. Hwang

Case Study of Early Detection of Iron Contamination in Copper Damascene Plating Process by In-Situ Electrochemical Sensor 91
A. Jaworski, H. Wikiel, K. Wikiel, P. Holverson, A. Nelson

Electrodeposition and Characterisation of Novel Ni-NbO_x Composite Coatings as a Diffusion Barrier for Liquid Solder Interconnects - Part II: Diffusion Barrier Performance 109
J. Wang, G. D. Wilcox, R. J. Mortimer, C. Liu, M. A. Ashworth

On the Fabrication of Backside Illuminated Image Sensors: Bonding Oxide, Edge Trimming and CMP Rework Routes 123
C. Cavaco, L. Peng, F. Sebaai, G. Verbinnen, J. Visker, J. Olmen, D. S. Tezcan, H. Osman

Author Index 131