# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>iii</td>
</tr>
<tr>
<td><strong>ADVANCES IN WET CLEANING</strong></td>
<td></td>
</tr>
<tr>
<td>SINGLE-WAFER SPIN CLEANING WITH REPETITIVE USE OF OZONIZED WATER AND</td>
<td>1</td>
</tr>
<tr>
<td>DILUTED HF (“SCROD”)</td>
<td></td>
</tr>
<tr>
<td>T. Osaka, A. Okamoto, H. Kuniyasu, and T. Hattori (Invited)</td>
<td>3</td>
</tr>
<tr>
<td>EVALUATION OF NEW MEGASONIC SYSTEM FOR SINGLE WAFER CLEANING</td>
<td></td>
</tr>
<tr>
<td>Umemura, Y. Wu, M. Bran, and B. Fraser</td>
<td></td>
</tr>
<tr>
<td>ADVANCED SINGLE CHEMISTRY ALKALINE CLEANING IN A SINGLE TANK TOOL</td>
<td></td>
</tr>
<tr>
<td>B. Onsia, E. Schellkes, R. Vos, S. De Gendt, O. Doll, A. Fester,</td>
<td>23</td>
</tr>
<tr>
<td>B. Kolbesen, M. Hoffman, Z. Hatcher, K. Wolke, P. Mertens, and M.</td>
<td></td>
</tr>
<tr>
<td>Heyns</td>
<td></td>
</tr>
<tr>
<td>NEW SHORT CYCLE WET CLEANING CONCEPT FOR 300 mm FABRICATION LINE</td>
<td></td>
</tr>
<tr>
<td>S. Verhaverbeke and K. Truman</td>
<td>31</td>
</tr>
<tr>
<td><strong>ORGANICS</strong></td>
<td></td>
</tr>
<tr>
<td>IMPACT OF ORGANIC CONTAMINATION ON DEVICE PERFORMANCE</td>
<td></td>
</tr>
<tr>
<td>D. Riley, J. Guan, G. Gale, G. Bersuker, J. Bennett, P. Lysaght, and</td>
<td>39</td>
</tr>
<tr>
<td>B. Nguyen</td>
<td></td>
</tr>
<tr>
<td>INFLUENCE OF MOLECULAR WEIGHT OF ORGANIC CONTAMINANTS UPON ADSORPTION</td>
<td></td>
</tr>
<tr>
<td>BEHAVIORS ONTO SILICON SURFACES</td>
<td>47</td>
</tr>
<tr>
<td>M. Nagase, M. Kitano, Y. Wakayama, Y. Shirai, and T. Ohmi</td>
<td></td>
</tr>
<tr>
<td>THE REMOVAL OF ORGANIC CONTAMINATION BY O$_2$/DI-WATER PROCESSES: A</td>
<td>54</td>
</tr>
<tr>
<td>THEORETICAL STUDY</td>
<td></td>
</tr>
<tr>
<td>F. De Smedt, H. Vankerckhoven, C. Vinckier S. De Gendt, M. Claes, and</td>
<td></td>
</tr>
<tr>
<td>M. Heyns</td>
<td></td>
</tr>
</tbody>
</table>
REMOVAL OF LIGHT AND HEAVY ORGANICS BY OZONE PROCESSES
A. Sehgal and M. R. Yalamanchili 61

EFFECT OF pH VALUES IN OZONIZED ULTRAPURE WATER ON CLEANING EFFICIENCY
I. Yokoi, G.-M. Choi, and T. Ohmi 69

REMOVAL OF PHOTORESIST BY O₃ DI-WATER PROCESSES: DETERMINATION OF DEGRADATION PRODUCTS
H. Vankerkhoven, F. De Smedt, C. Vinckier, B. Van Herp, M. Claes, S. De Gendt, and M. Heyns 77

METALS 85

ENGINEERING TOOLS FOR DESIGNING A METALLIC REMOVAL SOLUTION
S. Verhaverbeke (Invited) 87

REDUCTION OF SURFACE METALLIC CONTAMINATION THROUGH OPTIMIZED RINSING AND SINGLE-WAFER DRYING
W. Fyen, F. Holsteyns, J. Lauerhaas, T. Beards, P. Mertens, and M. Heyns 91

DIFFERENT ADSORPTION BEHAVIORS OF PLATINUM GROUP METALS ON SILICON SURFACES
I. Yokoi, K. Kitami, G.-M. Choi, and T. Ohmi 102

CO-DEPOSITION MECHANISM OF TRACE Cu AND Fe ON H-Si (100) SURFACE IN BUFFERED FLUORIDE SOLUTIONS
T. Homma, T. Kono, T. Osaka, M. Chemla, and V. Bertagna 110

A STUDY OF METALLIC CONTAMINATION REMOVAL AND ADDITION USING MODIFIED SC-1 SOLUTIONS
C. Beaudry, H. Morinaga, and S. Verhaverbeke 118

MICRO-CONTAMINATION OF COPPER AND SILVER ON SILICON WAFER SURFACES
X. Cheng, C. Gu, and Z.-D. Feng 126

IONIC CONTAMINATION OF THE SILICON WAFER FROM WAFER CLEANING PROCESS
H. O. Omorogie, S. J. Buffat, and D. Sinha 135
PARTICLES

SUB 100nm PARTICLE REMOVAL WITH DEIONIZED WATER AND A MEGASONIC FREQUENCY OF 835kHz
J. Lauerhaas, Y. Wu, K. Xu, G. Vereecke, R. Vos, K. Kenis, P. Mertens, T. Nicolosi, and M. Heyns

EFFECT OF H2O2 AND IPA ADDITION IN DILUTE HF SOLUTION ON SURFACE ETCHING AND PARTICLE REMOVAL EFFICIENCY

ACTIVITY OF HF SOLUTIONS AND PARTICLE REMOVAL USING HF SOLUTIONS
S. Nelson, J. Sabol, and K. Christenson

EFFECT OF WAFER BACKSIDE ON PARTICLE ADDITION BEHAVIOUR OF HF-RCA SEQUENCE
M. Strada, D. Lodi, E. Bellandi, and M. Alessandri

NEW APPROACH FOR STUDY OF PARTICLE ADHESION AND REMOVAL RELEVANT TO POST CMP CLEANING

OPTIMIZATION OF A BRUSH SCRUBBER FOR NANO-SIZED PARTICLES

NATIVE OXIDE

INFLUENCE OF AMBIENT OXYGEN AND MOISTURE ON THE GROWTH OF NATIVE OXIDE ON SILICON SURFACES IN MINI-ENVIRONMENTS
K. Saga, H. Kuniyasu, and T. Hattori

SPECTROSCOPIC AND ELECTROCHEMICAL STUDIES OF THE GROWTH OF CHEMICAL OXIDE IN SC1 AND SC2
S. Petitdidier, F. Guyader, K. Barla, D. Rouchon, N. Rochat, R. Erre, and V. Bertagna

ELECTROCHEMICAL STUDY OF ULTRA-THIN SILICON OXIDES
V. Bertagna, R. Erre, S. Petitdidier, D. Levy, and M. Chemla
DRY CLEANING

A SURFACE CHEMISTRY APPROACH TO THE DEVELOPMENT
OF GAS-PHASE WAFER CLEANING PROCESSES
A. J. Muscat, A. Thorsness, G. Montano-Miranda, and C. Finstad (Invited)

VACCUUM CLUSTERED DRY CLEANING FOR PRE-GATE
SURFACE PREPARATION
B. Schwab, R. Gifford, and J. Butterbaugh

GAS-PHASE SURFACE CONDITIONING IN A HIGH-k GATE
CLUSTER
Mumbauer, R. Grant and J. Ruzyillo

ETCHING OF SILICON NATIVE OXIDE USING ULTR-SLOW
MULTICHARGED Ar⁺ IONS
V. Le Roux, G. Machicoane, G. Borsoni, M. Korwin-Pawlowski, N. Bechu, S.
Kerdiles, R. Laffitte, L. Vallier, P. Roman, C.-T. Wu and J. Ruzyillo

CRYOKINETIC CLEANING ON Cu/LOW-k DUAL DAMASCENE
STRUCTURES
B. Kirkpatrick, E. Williams, S. Lavangkul, and J. Butterbaugh

BACK-END CLEANS

SURFACE PREPARATION CHALLENGES WITH Cu/Low-k
DAMASCENE STRUCTURES
B.K. Kirkpatrick (Invited)

POST ETCH/ASH CLEANING OF DUAL DAMASCENE STRUCTURES:
SINGLE WAFER MEGASONICS WITH STG DRY
Y. Fan, Y. Wu, and B. Fraser

IMPROVED POST-ETCH VIA CLEAN WITH FLUORIDE
BASED SEMI-AQUEOUS CHEMISTRY USING INTERMEDIATE RinSE
J. Diedrick, M. Fussy, S.R. Small, and W. Robertson

CORROSIVE BEHAVIOR OF TUNGSTEN IN POST-ETCH
RESIDUE REMOVER
EMERGING TECHNOLOGIES

EFFECTS OF SUPERCRITICAL CO₂ ON THE ELECTRICAL CHARACTERISTICS OF SEMICONDUCTOR DEVICES
C. O'Murchu, A. Mathewson, and E. Francais

OZONATED HF APPLICATIONS IN A SPRAY PROCESSING
M. Claes, E. Rohr, S. De Gendt, S. Lagrange, E. Bergman,
and M. Heyns

THE EFFECT OF SURFACANTS IN DILUTE HF SOLUTIONS
M. Leahman, M. Simmons, M. Jackson, C. Spivey, B. Hong,
and E. J. Mori

IMPROVEMENT OF SC-1 BATH STABILITY BY COMPLEXING AGENTS
H. Saloniemi, T. Visti, S. Eranen, Kiviranta, and O. Anttila

PREVENTION OF Si ETCHING IN DILUTED SC1 SOLUTIONS
E. Bellandi, M. Alessandri, D. Lodi, M. Strada, S. Pipia, S. Petitdidier,
and D. Levy

In Situ PRE-EPI CLEAN PROCESS FOR NEXT GENERATION DEVICES
I. Kashkoush, G. Chen, R. Ciari, and R. Novak

ADVANCED PRE-GATES FOR HIGH QUALITY THIN OXIDES AND NITRIZED OXIDES
E. Baiya, J. Rosato, D. Acoot, and J. Smythe

EFFECT OF COMPOSITION AND POST-DEPOSITION ANNEALING ON THE ETCH RATE OF HAFNIUM AND ZIRCONIUM SILICATES IN DILUTE HF

AUTHOR INDEX

SUBJECT INDEX