2016 27th Annual SEMI Advanced Semiconductor Manufacturing Conference (ASMC 2016)

Saratoga Springs, New York, USA
16-19 May 2016

IEEE Catalog Number: CFP16ASC-POD
ISBN: 978-1-5090-0271-9

Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

******This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP16ASC-POD
ISBN (Print-On-Demand):	978-1-5090-0271-9
ISBN (Online):	978-1-5090-0270-2
ISSN:	1078-8743

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC. proceedings.com

TABLE OF CONTENTS

EFFECT OF POST CMP IN-SITU CLEANING AND ITS OPTIMIZATION ON THE DEFECT IMPROVEMENT: CFM: CONTAMINATION FREE MANUFACTURING 1
Hong Jin Kim ; Tae Hoon Lee ; Venugopal Govindarajulu ; Jason Mazzotti

FOUP PURGE PERFORMANCE IMPROVEMENT USING EFEM FLOW CONVERTER 6
Seong Chan Kim ; Greg Schelske

A SOLVENT FREE METHOD FOR POST PAD ETCH WAFER CLEANING 12
Mohamed Boumerzoug

QUALITY CONTROL FOR ULTRAFILTRATION OF ULTRAPURE WATER PRODUCTION FOR HIGH END SEMICONDUCTOR MANUFACTURING 16
Jochen Ruth ; Rolf Berndt

MOLYBDENUM CONTAMINATION IN BF2 HIGH CURRENT ION IMPLANTATION CAUSING PNP BETA VARIABILITY: CFM/CONTAMINATION FREE MANUFACTURING 23
Aaron Smith ; Peter Kurkowski ; Thanas Budri

MANUFACTURING EXCELLENCE USING MULTI-PLATFORM ELLIPSOMETRY THICKNESS MEASUREMENT FLEET ON ADVANCED NODES 30
Michael Lenahan ; Alok Vaid ; Sridhar Mahendrakar ; Steven Seipp ; David Jayez ; Alice Yueh ; Shweta Saxena ; Eric Solecky ; Samuel Gizzi ; Amir Heller ; Tianhao Zhang ; Da Song ; Nam Hee Yoon ; Janay Camp ; Kartik Venkataraman

HRXRD FOR IN-LINE MONITORING OF ADVANCED FD-SOI TECHNOLOGY: USE-CASES: AM: ADVANCED METROLOGY 37
D. Le Cunff ; R. Duru ; A. Durand ; F. Pernot ; M. Wormington ; A. Tokar ; D. Rouchon ; P. Gergaud

INLINE MONITORING OF SIGE STRAIN RELAXED BUFFERS (SRBS) USING HIGH-RESOLUTION X-RAY DIFFRACTION: AM: ADVANCED METROLOGY 44
B. Mendoza ; B. L'Herron ; N. Loubet ; J. Fronheiser ; A. Reznicek ; J. Gaudiello ; P. Gin ; K. M. Matney ; J. Wall ; P. Ryan ; M. Wormington

POLY RECESS DEPTH IN TWO DIFFERENT TRENCH MOSFETS MEASURED WITH SCATTEROMETRY: AM: ADVANCED METROLOGY 50
Franz Heider ; Christian Janeschitz ; Martin Haberjahn ; Chi Eng New ; Kin Loon Chow ; Jeffrey W. Roberts

NON-DESTRUCTIVE ACOUSTIC METROLOGY AND VOID DETECTION IN 3X50µM TSV 54
R. Mair ; M. Kotelyanskii ; M. Mehendale ; X. Ru ; P. Mukundhan ; T. Kryman ; M. Liebens ; S. Van Huylenbroeck ; L. Haensel ; A. Miller ; E. Beyne ; T. Murray

LINE END VOIDS DEFECTIVITY IMPROVEMENT ON 64 PITCH CU WIRE INTERCONNECTS OF 14 NM TECHNOLOGY 60
Michael Daino ; Graham Jensen ; Ankit Jain ; Sumanth Kini ; Atul Bawari ; Balajee Rajagopalan ; Hirokazu Aizawa ; Jae Choo ; Amit Srivastava ; Ian Tolle ; Ronald Huang ; Shiran Xiao ; Hoang Nguyen

PROCESS WINDOW DISCOVERY METHODOLOGY DEVELOPMENT FOR ADVANCED LITHOGRAPHY 65
Dieter Van Den Heuvel ; Philippe Foubert ; Bart Baudemprez ; Angelica Lee ; Andrew Cross ; Kaushik Sah ; Naoshin Haque ; Paolo Parisi ; Oksen Baris

DETECTION OF PRINTABLE EUV MASK ABSORBER DEFECTS AND DEFECT ADDERS BY FULL CHIP OPTICAL INSPECTION OF EUV PATTERNED WAFERS 72
Luciana Meli ; Scott D. Halle ; Ravi Bonam ; Nelson Felix ; Kaushik Vemareddy

A STUDY ON THE INTERACTION BETWEEN BARRIER AND PLATING CAUSING EDGE STRINGER DEFECTS IN 28NM 79
Eswar Ramanathan ; Antonio Fiacco ; Silvestre Mary Claire ; Val Parks ; Balajee Rajagopalan ; Hildreth Scott ; Barker John ; Riendeau ; Jeffrey ; Laloe ; Jean-Baptiste ; Frank Smith

NOVEL METHODS FOR SPC DEFECT MONITORING: NORMALIZABLE DIVERSITY SAMPLING: DEFECT INSPECTION 83
Ian Tolle ; Ankit Jain ; Martin Plihal ; Sumanth Kini

EMPOWERING EXISTING AUTOMATED MATERIAL HANDLING SYSTEMS TO RISING REQUIREMENTS: FA: FACTORY AUTOMATION 87
Christian Hammel ; Robert Schmaler ; Thorsten Schmidt ; Jorg Lubke ; Matthias Schops ; Ulrich Horn ; Marcin Mosinski

DISPATCHING RULES CONSIDERING TRANSPORT-RELATED RESTRICTIONS DURING FAILURE SCENARIOS - A USE CASE: FA: FACTORY AUTOMATION 94
Robert Schmaler ; Christian Hammel ; Thorsten Schmidt ; Matthias Schops

MODELING THE VARIANCE OF THE DURATIONS OF MAINTENANCE ACTIVITIES IN SEMICONDUCTOR FABS 100
Itai Regev ; Yisrael Parmet ; Diamanta Benson-Karhi

MANAGEMENT OF CRISIS SITUATIONS IN A LARGE UNIFIED AMHS OF A SEMICONDUCTOR MANUFACTURING FACILITY: IE: INDUSTRIAL ENGINEERING 106
Moulaye Aidara Ndiaye ; Stephane Dauzere-Peres ; Claude Yugma ; Lionel Rulliere ; Gilles Lamiable

AMHS DESIGN FOR RETICLES IN PHOTOLITHOGRAPHY AREA OF AN EXISTING WAFER FAB: IE: INDUSTRIAL ENGINEERING 110
Ali Ben-Salem ; Claude Yugma ; Emmanuel Troncet ; Jacques Pinaton

450MM PVD MHM TIN PROCESS DEVELOPMENT AND PROCESS CHAMBER EVALUATION USING DC POWER SYSTEM 116
Barry Wang ; M. H. Chen ; J. H. Xie ; Stock Chang

ADVANCED CMP PROCESSES FOR 450MM APPLICATIONS 119
H. M. Wang ; I. Kobata ; T. Ishibashi ; G. Stapft ; Daniel Franca

BEVEL RINSE OPTIMIZATION FOR REDUCED EDGE DEFECTIVITY AND IMPROVED EDGE YIELD 124
Mary Claire Silvestre ; Eswar Ramanathan ; Scott Hildreth ; Mark Duggan ; Jeffrey Riendeau ; Laurent Dumas

COPPER PROCESS CONTROL WITH PICOSECOND ULTRASONIC TECHNOLOGY: A STUDY 129
Shravanthi L Manikonda ; Manasa Medikonda ; Snehal Patel ; Abner Bello ; Jun Song ; Priya Mukundhan

THE CORRECT LEVEL OF MODEL COMPLEXITY IN SEMICONDUCTOR FAB SIMULATION - LESSONS LEARNED FROM PRACTICE 133
Sebastian Rank ; Christian Hammel ; Thorsten Schmidt ; Jan Muller ; Andre Wenzel ; Rainer Lasch ; Germar Schneider

CU SEED OPTIMIZATION FOR MINIMUM PITCH WIRING IN 10NM AND BEYOND 147
Adam Da Silva ; Prakash Periasamy ; Jeric Sarad ; Anbu Selvam Mahalingam ; San Leong Liew ; Craig Child

DATA MINING TO DETECT ION SOURCE FAILURES IN VARIAN VIISTA IMPLANTERS 149
Sidda Reddy Kurakula ; Joseph Trujillo

DETECTION OF ELECTRICAL DEFECTS WITH SEMVISION IN SEMICONDUCTOR PRODUCTION MODE MANUFACTURING 151
Travis Newell ; Brock Tillotson ; Haim Pearl ; Andrei Miller

DEVELOP GAP-FILL PROCESS OF SHALLOW TRENCH ISOLATION IN 450MM WAFER BY ADVANCED FLOWABLE CVD TECHNOLOGY FOR SUB-20NM NODE 157
Min-Hui Chen ; Stock Chang

ELIMINATION OF TUNGSTEN-VOIDS IN MIDDLE-OF-LINE CONTACTS FOR ADVANCED PLANAR CMOS AND FINFET TECHNOLOGY 160
Wen Pin Peng ; Min-Hwa Chi

ESTIMATION OF NUMBER OF PGV FOR A 450MM FAB: FA: FACTORY AUTOMATION 164
Chih-Wei Huang ; Christopher L. Borst

IMPACT OF FOUP ENVIRONMENT ON PRODUCT YIELD IN ADVANCED TECHNOLOGIES 168
Sara Case ; Stephanie Waite ; John Barker ; Wei Zhao ; Jong Soo Kim ; Joshua Moore ; Eswar Ramanathan

IMPROVEMENT OF HYDROGEN DETECTION LIMIT FOR QUADRUPLE SIMS TOOL 172
Z. Zhang ; B. Hengstebeck ; F. A. Stevie ; M. Hopstaken

MEASUREMENT OF NANOPARTICLES ON PARTS: FIGURES OF MERIT OF A LIQUID-BORNE PARTICLE COUNTER 176
Bin Liu ; Shi Liu

MULTIPLE IN/MULTIPLE OUT, RUN TO RUN CONTROLLER FOR ACCURATE AND STABLE EPITAXY PROCESSES: APC: ADVANCED PROCESS CONTROL 180
Rintsch Benjamin ; Lippl Gerhard ; Lipp Stefan

NEXT GENERATION ADVANCED PROCESS CONTROL: LEVERAGING BIG DATA AND PREDICTION 191
James Moyne ; Brad Schulze ; Jimmy Iskandar ; Michael Armacost

NON-TRADITIONAL INSPECTION STRATEGY FOR INLINE MONITORING IN EXCURSION SCENARIOS: DEFECT INSPECTION 197
Amit Srivastava ; Ian Tolle ; Aleister Mraz ; Sachin Gupta ; Ronald Huang ; Hoang Nguyen ; Liton Dey ; Ankit Jain ; Sang-Hyun Lee ; Sumanth Kini

ON-SITE FLUORINE CHAMBER CLEANING FOR SEMICONDUCTOR THIN-FILM PROCESSES: SHORTER CYCLE TIMES, LOWER GREENHOUSE GAS EMISSIONS, AND LOWER POWER REQUIREMENTS 201
Jean-Charles Cigal ; Sean Lee ; Paul Stockman

OPTIMIZATION OF PRE AND POST RECIPE SENSITIVITY FOR UNPATTEMED WAFER DEFECTIVITY INSPECTION 206
Darryl Restaino ; Nicole Hurst ; Todd Abrams ; Alexander Parker ; Chandar Palamadai ; Mayrita Arrandale ; Shawn Macnish

PARAMETERS INFLUENCING UNWANTED GROWTH DURING EPITAXIAL GROWTH OF SIGE 212
Talapady Srivatsa Bhat ; Aaron Chadwick ; Hong Wei ; Ankur Sharma ; Sivakumar Kumarasamy ; Matthew Stoker ; Scott Hildreth ; Keith Chung ; Ying Hao Hsieh

PROCESS EVALUATION, VALIDATION, AND MONITORING WITH RING OSCILLATOR SCRIBELANE MODULES 218
Hoang Dao

RAPID UNCONSTRAINED FAB MODEL USING A BUSINESS INTELLIGENCE TOOL: DM: DATA MANAGEMENT AND DATA MINING TOOLS 220
Subramaniam Pazhani ; Madan Chakravarthi ; Diwas Adhikari

RECOVERING FROM A YIELD EXCURSION: A SIMULATED CASE STUDY 224
Jeanne Paulette Bickford ; Allison Rose Bannister

REDUCTION OF EXTRA PATTERN DEFECTS IN IMMERSION LAYER REWORKS BY CLEANS RECIPE OPTIMIZATION: CFM: CONTAMINATION FREE MANUFACTURING 229
Dhiman Bhattacharyya ; Wei Hong ; Kay Peng ; Vincent Sih

RELIABILITY ASSESSMENT OF ANODIC FILMS UNDER PLASMA ETCHING PROCESS 233
Je-Boem Song ; Jin-Tae Kim ; Seung-Su Lee ; Seong-Geun Oh ; Eunsoon Oh ; Ju-Young Yun

STI 28NM PITCH GUIDED DSA TO ENABLE THE 450MM TOOLS QUALIFICATION AND TRANSITION 237
Anne-Sophie Larrea ; Shannon Dunn ; Wenli Collison ; Daniel Franca ; Christopher Borst ; Janghee Lee ; Jongheun J H Lim ; Stock Chang

SUPPLIER ENGAGEMENT 243
David Tucker ; Alison Brown ; Robert Royalty ; Curtis Hall

SURFACE CONTAMINATION CONTROL THROUGH ATOMICALLY CLEAN SURFACE (ACS^{TM}) PROCESSING FOR SEMICONDUCTOR EQUIPMENT PARTS FOR SUB-20 NANOMETER NODES (TOPICS: CFM, DI, ER, YE) 246
Ardeshir Ardy J. Sidhwa ; Osama Khalil ; John Deem ; David Zuck ; Matthew House

THERMAL TRANSPORT IN NANOSTRUCTURED ELECTRONIC MATERIALS: ET/ID: ENABLING TECHNOLOGIES AND INNOVATIVE DEVICES 252
Arthur France-Lanord ; Volker Eyert ; Alexander Mavromaras ; Roman Tarnovsky ; Erich Wimmer ; Clive Freeman ; Paul Saxe

THE USE OF CGS TECHNOLOGY IN A 3D MANUFACTURING ENVIRONMENT 258
Jeffrey Mileham ; David M. Owen ; Doug Anberg ; Yasushi Tanaka

VERY SENSITIVE REAL-TIME INLINE PROCESS MASS SPECTROMETER BASED ON FFT ION TRAP TECHNIQUE 263
Hin Yiu Chung ; Michel Aliman ; Gennady Fedosenko ; Alexander Laue ; Rudiger Reuter ; Valerie Derpmann ; Leonid Gorkhover ; Martin Antoni

VISIBLE AND NONVISIBLE DEFECTS IN 3DIC FLOWS 267
Jacob Orbon

VOLTAGE REGULATOR BIN FAILURE IMPROVED BY OPTIMIZED CIRCUIT LAYOUT AND NOVEL LASER ANNEAL PROCESS 271
Y. W. Ma ; Wei Liang Huang ; Chien Hsin Lai ; P. G. Lim ; Hein Mun Lam ; Chee Kong Leong

YIELD ENHANCEMENT IN STRIPPER PROCESS AND RELATED PROCESS USING SENSARRAY HIGHTEMP WAFER 274
Shih-En Tseng ; Ming-Lang Chen

IN-LINE CHARACTERIZATION OF EDRAM FOR A FINFET TECHNOLOGY USING VC INSPECTION 278
Oliver D. Patterson ; Richard Hafer ; Surbhi Mittal ; Ankur Arya ; Kenneth Stein ; Herbert Ho ; William Davies ; Xiaohu Tang ; Brian Yueh-Ling Hsieh ; Shuen-Cheng Chris Lei

A CASE STUDY ON INLINE DEFECT DIAGNOSIS BY APPLYING E-BEAM INSPECTION SYSTEM 285
Hao-Yu Chien ; Chan-Hao Hsu ; Yue-Ying Yen ; Tzung-Hua Ying

E-BEAM TOOL-TO-TOOL MATCHING METHODOLOGY: DI: DEFECT INSPECTION AND REDUCTION 289
Xing J. Zhou ; Ho Young Derek Kim

DETECTION AND CLASSIFICATION OF GATE TO S/D SHORTS USING CHARGE DYNAMICS 294
Ming Lei ; Kevin Wu ; Qing Tian ; Yan Zhao

LASER-BASED FA TECHNIQUES FOR MONITORING OF DEFECTIVE SRAM JUNCTIONS 300
Gregory M. Johnson ; Christopher D'Aleo

IMPROVED 20NM DEVICE YIELD AND GATE DIELECTRIC INTEGRITY WITH OPTIMIZED ALUMINUM METAL FILL PROCESS 308
David Williams ; Clint Bordelon ; Sergei Drizlikh ; Paul D. Kirsch ; Kin-Sang Lam ; Paul Coppala ; Ian Guerassio ; Nikhil Bharat Hira ; Steven Trigno ; Paul Nester ; Ryan Paulsen ; Anuj Patel ; Jun-Han Kim ; Jungmin Park ; Taegyun Kim ; Hee Sung Kang ; Jinho Seo ; Chulwan An ; Sunjong Wang

INVESTIGATION ON CRITICAL THICKNESS DEPENDENCE OF ALD TIN DIFFUSION BARRIER IN MOL 313
Archana Subramaniyan ; Domingo Ferrer Luppi ; Neal Makela ; Lawrence Bauer ; Anita Madan ; Richard Murphy ; Frieder Baumann ; Kriti Kohli ; Christopher Parks

METAL WIRING CRITICAL DIMENSION SHRINK USING ALD SPACER IN BEOL SUB-50NM PITCH 316
Ketan Shah ; Prakash Periasamy ; Ashwini Chandrasekhar ; Anbu Selvam K M Mahalingam ; Shyam Pal ; Christopher Ordonio ; Peter Welti ; Chun Hui Low ; Craig Child

INTERFACE PRESERVATION DURING GE-RICH SOURCE/DRAIN CONTACT FORMATION 320
C. Niu ; M. Raymond ; V. Kamineni ; J. Fronheiser ; S. Siddiqui ; H. Niimi ; J. M. Dechene ; A. Labonte ; P. Adusumilli ; A. V. Carr ; J. Shearer ; J. Demarest ; L. Jiang ; J. Li ; R. W. Hengstebeck

MOORE'S LAW CONTINUES INTO THE 1X-NM ERA 324
Dick James

REDUCTION OF "DARK-GATE" DEFECTS IN REPLACEMENT-METAL-GATE PROCESS AND MIDDLE-OF-LINE CONTACTS FOR ADVANCED PLANAR CMOS AND FINFET TECHNOLOGY 330
Wen Pin Peng ; Min-Hwa Chi

DETECTING AND PREVENTING GATE OXIDE PLASMA DAMAGE DURING PECVD CARBON DEPOSITION THROUGH SURFACE PHOTOVOLTAGE MEASUREMENTS 335
Alan K. Fritz ; Leonard J. Olmer

OPTIMIZED CIRCUIT DESIGN AND NOVEL AL DEPOSITION PROCESS CURE POWER SHORT FAILURE CAUSED BY AL WHISKER 341
Y. W. Ma ; Chien Hsin Lai ; Zhi Min Zhang ; Wei Liang Huang ; Chao Yong Li ; Cong Shu Zhou ; Chee Kong Leong

YIELD IMPROVEMENT AND QUEUE TIME RELAXATION AT CONTACT PROCESS 344
Niti Garg ; Philippe Helal ; Pranesh Muralidhar ; Stephen Crown ; Vincent Sih ; Stephanie Waite ; Silas Scott

TRANSIENT LEAKAGE OF POINT-DEFECTS IN GATE OXIDE DUE TO SPATIALLY TRANSPORTED CONSTANT-SOURCE OF PHOSPHORUS CONTAMINANTS 350
Lieyi Sheng ; Brett Williams ; Thomas Haskett ; Eddie Glines

EXTRA-PATTERN KILLER DEFECTIVITY IMPROVEMENT AND ENHANCEMENT OF WITHIN-FEATURE BARRIER COVERAGE BY OPTIMIZATION OF TAN BARRIER PVD PROCESS IN 90P CU WIRE INTERCONNECTS FOR 28NM TECHNOLOGY 354
Balajee Rajagopalan ; Jean-Baptiste Laloe ; Mary Claire Silvestre ; Eswar Ramanathan ; Sohana Khanal ; Alain Laval ; Qian Ge ; Nobuyuki Takahashi ; Anbu Selvam Mahalingam ; San Leong Liew ; Robert Teagle

PATTERN DEPENDENT PLASMA CHARGING EFFECT IN HIGH ASPECT RATIO 3D NAND ARCHITECTURE 358
Zusing Yang ; Yao-An Chung ; Sheng-Yuan Chang ; Hong-Ji Lee ; Nan-Tzu Lian ; Tahone Yang ; Kuang-Chao Chen ; Chih Yuan Lu

PRECLEANS CHALLENGES ON MIDDLE-OF-THE-LINE CONTACTS FOR 14NM TECHNOLOGIES AND BEYOND 361
Domingo A. Ferrer ; Annie Levesque ; Asli Sirman ; Junedong Lee ; Archana Subramaniyan ; Lou Lanzerotti ; David F. Hilscher ; Emre Alptekin

OPTIMIZATION OF WET CLEAN AND ITS IMPACT ON SUB-50 NM PITCH BEOL YIELD 364
A K M Sajjadul Islam ; Prakash Periasamy ; Ashwini Chandrasekhar ; Anbu Selvam K M Mahalingam ; Christian Witt ; Craig Child

OPTIMIZING WET CLEAN OPERATIONS IN AN ESTABLISHED MANUFACTURING ENVIRONMENT 367
Raymond Van Roijen ; David F. Hilscher ; Colleen Meagher ; Ryan Rettmann ; Derek McKindles

NOVEL HYBRID 3D NAND FLASH MEMORY CONTAINING VERTICAL-GATE AND GATE-ALL-AROUND STRUCTURES 371
Yao-An Chung ; Zusing Yang ; Yuan-Chieh Chiu ; Shih-Ping Hong ; Hong-Ji Lee ; Nan-Tzu Lian ; Tahone Yang ; Kuang-Chao Chen ; Chih-Yuan Lu

LOGIC CHARACTERIZATION VEHICLE DESIGN FOR YIELD LEARNING 375
Ben Niewenhuis ; Zeye Dexter Liu ; Soumya Mittal ; R. D. Shawn Blanton

PROCESS WINDOW TRIPLING BY OPTIMIZED SRAF PLACEMENT RULES: AP/DFM: ADVANCED PATTERNING/DESIGN FOR MANUFACTURABILITY 381
Lianghong Yin ; Changan Wang ; Luozhou Li ; William Wilkinson ; Shaowen Gao ; Jason Cantone ; Michael Hsieh

IMMERSION LITHOGRAPHY SCANNER READINESS FOR VOLUME MANUFACTURING ON 450MM SUBSTRATES: AP/DFM: ADVANCED PATTERNING/DESIGN FOR MANUFACTURABILITY 387
Christopher R. Carr ; Jasper P. Munson ; Russell A. Black

MAINTENANCE OF VIRTUAL METROLOGY MODELS 393
Jimmy Iskandar ; James Moyne

A MULTI-STEP WAFER-LEVEL RUN-TO-RUN CONTROLLER WITH SAMPLED MEASUREMENTS FOR FURNACE DEPOSITION AND CMP PROCESS FLOWS: APC: ADVANCED PROCESS CONTROL 399
Yulei Sun ; Joerg Reichelt ; Tilo Bormann ; Andreas Gondorf

OPTICAL EMISSION SPECTRUM PROCESSING USING DISCRETE-WAVELET TRANSFORM COMPRESSION 403
Taikang Ning ; C H Huang ; J. Jensen ; V. Wong ; H. Chan

VIRTUAL METROLOGY BASED ON RELEVANT FEATURE EXTRACTION AND JUST-IN-TIME LEARNING APPROACH 407
M. A. Jebri ; G. Graton ; E. M. El Adel ; M. Ouladsine ; J. Pinaton

AN INTEGRATED APPROACH TO HOLISTIC METROLOGY QUALIFICATION FOR MULTI-PATTERNING PROCESS LAYERS: AM: ADVANCED METROLOGY 413
Emil Schmitt-Weaver ; Lotte Willems ; Hans Van Der Laan ; Jochem Wildenberg ; Omer Adam ; Grzegorz Grzela ; Joost Van Heijst ; Henry Megens ; Kaustuve Bhattacharyya

ETCH PROCESS MONITORING POSSIBILITIES AND ROOT CAUSE ANALYSIS 419
T. Shapoval ; J. Engelmann ; C. Kroh ; N. Schmidt ; S. Agarwal ; R. Ramkhalawon ; A. Cangiano ; L. Debarge ; R. Haupt ; R. Melzer ; C. Hartig ; B. Schulz ; A. Reichel ; R. Seltmann ; M. Ruhm

REDUCING METROLOGY MEAN-TIME-TO-DETECT BY UTILIZING PRODUCT DATA 423
Douglas Crauder ; Eric Solecky ; Jason Emans

A NOVEL TECHNIQUE FOR EPITAXY TOOL-TO-TOOL AND CHAMBER MATCHING AND OPTIMIZATION: ER: EQUIPMENT RELIABILITY AND PRODUCTIVITY ENHANCEMENTS 429
Richard G. Cosway ; Steven R. Burch ; Andrew D. Rosser ; Phillip T. Lazok

THROUGHPUT EVALUATION MODEL FOR THE LINEAR PLATFORM IN SEMICONDUCTOR MANUFACTURING 435
Kai-Ting Yang ; Elvis Huang ; Leo Ke ; Tina Shen

WAIT-TIME-WASTE IMPROVEMENT OPPORTUNITIES AND 'SMART MANUFACTURING' IN LEGACY 200MM FABS 440
Jan Driessen ; Rene Sjardijn ; Frank Van Heukelom ; Corstian Van Roest ; Martijn Mom

TRENCH FIRST METAL HARDMASK POST-LITHOGRAPHY NOVEL REWORK PROCESS FOR DEFECTIVITY AND YIELD IMPROVEMENT 446
Mary Claire Silvestre ; Mukesh Gogna ; Anbu Selvam K M Mahalingam ; Eswar Ramanathan ; Christopher Ordonio ; John Schaller

INLINE ELECTRICAL YIELD VERSUS OPTICAL INSPECTION: CORRELATIONS, CONNECTIONS AND DISCONNECTIONS 451
Fan Zheng ; Dave Salvador ; Cathy Gow ; Lori Kermel ; Bryan Rhoads ; Kan Zhang ; Xiao Pan ; Ben Stahl ; William Davies ; Amanda Tessier ; Edward Crawford ; Rebekah Sheraw ; Ishtiaq Ahsan ; Brett Engel ; Brad Austin ; Yongchun Xin ; Jang Sim

POLYMER SURFACE TREATMENT TO REDUCE RDL LEAKAGE AND SOLVE DELAMINATION ISSUE: YE: YIELD ENHANCEMENT/LEARNING 456
W. L. Huang ; J. J. Wong ; Danial Huang ; K. P. Chang ; H. S. Su ; Harry Ku

PROCESS DEVELOPMENT AND OPTIMIZATION FOR HIGH-ASPECT RATIO THROUGH-SILICON VIA (TSV) ETCH 460
Kumarapuram Gopalakrishnan ; Anurag Peddaiahgari ; Daniel Smith ; Dingyou Zhang ; Luke England

NON-CONDUCTIVE FILM UNDERFILL FOR 3D INTEGRATION OF 20 µM-THICK LSI WAFERS WITH FINE CU-TSVS 466
M. Murugesan ; J. C. Bea ; M. Koyanagi ; Y. Ito ; T. Fukushima ; T. Tanaka

ADVANCED DETECTION METHOD FOR POLYMER RESIDUES ON SEMICONDUCTOR SUBSTRATES: 3D/TSV/INTERPOSER: THROUGH SILICON VIA AND PACKAGING 472
H. Richter ; L. Pfitzner ; M. Pfeffer ; A. Bauer ; J. Siegert ; T. Bodner

Author Index