

2018 29th Annual SEMI Advanced Semiconductor Manufacturing Conference (ASMC 2018)

**Saratoga Springs, New York, USA
30 April – 3 May 2018**



**IEEE Catalog Number: CFP18ASC-POD
ISBN: 978-1-5386-3749-4**

**Copyright © 2018 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 is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18ASC-POD
ISBN (Print-On-Demand):	978-1-5386-3749-4
ISBN (Online):	978-1-5386-3748-7
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

ADVANCED DEFECT INSPECTION TECHNIQUES FOR NFET AND PFET DEFECTIVITY AT 7NM GATE POLY REMOVAL PROCESS	1
<i>Ian Tolle ; Michael Daino</i>	
MICRO-PHOTOLUMINESCENCE IMAGING OF DISLOCATION GENERATION IN 0.18μM POWER SEMICONDUCTOR DEVICES WITH DEEP TRENCHES	5
<i>B. Greenwood ; J. P. Gambino ; Y. Watanabe ; L. Jastrzebski ; G. Nadudvari ; D. T. Cseh ; L. Roszol ; G. Molnar ; I. Lajtos</i>	
DEFECT LEARNING METHODOLOGY APPLIED TO MICROBUMP PROCESS AT 20μM PITCH AND BELOW	10
<i>M. Liebens ; J. Slabbekoorn ; A. Miller ; E. Beyne ; M. Stoerring ; S. Hiebert ; A. Cross</i>	
DESIGN SYSTEMATIC WEAK POINT DISCOVERY OPTIMIZATION	18
<i>Sonal Singh ; Panneer Selvam Venkatachalam ; Julie Lee ; Michael Daino ; Barry Saville ; Chet Lenox</i>	
NOVEL SURFACE SCANNING INSPECTION SYSTEM FOR OPAQUE AND TRANSPARENT SUBSTRATES USING LASER DOPPLER VELOCIMETRY	23
<i>Mayeul Durand de Gevigney</i>	
A WAFER MAP YIELD MODEL BASED ON DEEP LEARNING FOR WAFER PRODUCTIVITY ENHANCEMENT	29
<i>Sung-Ju Jang ; Jee-Hyong Lee ; Tae-Woo Kim ; Jong-Seong Kim ; Hyun-Jin Lee ; Jong-Bae Lee</i>	
DEEP LEARNING BASED AUTOMATIC DEFECT CLASSIFICATION IN THROUGH-SILICON VIA PROCESS: FA: FACTORY AUTOMATION	35
<i>Joongsoo Kim ; Sihwan Kim ; Namyong Kwon ; Hyohyeong Kang ; Yongduk Kim ; Changhuhn Lee</i>	
A MULTI-PURPOSE OPERATIONAL CAPACITY AND PRODUCTION PLANNING TOOL	40
<i>Quentin Christ ; Stéphane Dauzère-Pérès ; Guillaume Lepelletier ; Philippe Vialletelle</i>	
AN APPROACH TO FUZZY CONTROL OF TARGET FUNCTION IN CONSIDERATION OF EQUIPMENT FLEXIBILITY AND WORKLOAD IN SEMICONDUCTOR PHOTO LITHOGRAPHY OPERATIONS	45
<i>Kuan-Chang Chen ; Bacon Tseng ; Yu-Chih Wang ; Yih-Yi Lee</i>	
A BI-CRITERIA MIXED INTEGER LINEAR PROGRAMMING MODEL FOR LOAD BALANCING AND CHEMICAL SAVING IN WAFER CLEANING PROCESSES: IE: INDUSTRIAL ENGINEERING	49
<i>Subramanian Pazhani ; Thomas Beeg ; Kristopher Kowalczyk ; Todd Dietrich</i>	
RING OSCILLATOR YIELD LEARNING METHODOLOGIES FOR CMOS TECHNOLOGY RESEARCH	54
<i>Victor Chan ; Dallas Lea ; Marc Bergendahl ; Gauri Karve ; T. M. Levin ; Chun-Wing Yeung ; Dechao Guo</i>	
A FIRST-TIME EXPLORATION INTO SEQUENCED MULTIMODALITY SAVES BIG DATA FOR HIGH-QUALITY WAFER-MANUFACTURING	58
<i>Lieyi Sheng ; Wei Pan</i>	
THE VALUE AND EFFECTIVENESS OF SENSOR TRACE ANALYTICS IN SOLVING YIELD IMPACT ISSUES: A CASE STUDY	62
<i>Hein Mun Lam ; Michael Zhao ; Ski Sim ; Kim Kok Gan ; Tom Ho ; Joe Lee</i>	
STUDY OF TI/TIN BUMP DEFECT FORMATION MECHANISM AND ELIMINATION BY ETCH PROCESS OPTIMIZATION	66
<i>Li-Lan Wu ; Yuan-Chieh Chiu ; Zusing Yang ; Sheng-Yuan Chang ; Hong-Ji Lee ; Nan-Tzu Lian ; Tahone Yang ; Kuang-Chao Chen ; Chih-Yuan Lu</i>	
BOX BREAKDOWN: A NOVEL DEFECT MODE IN A 14NM SOI FINFET TECHNOLOGY	70
<i>Ryan Rettmann ; Tim McCormack ; Oliver D. Patterson ; Hong Lin ; Karen Nummy ; Dan Poindexter ; Paul Parries</i>	
FULL FIELD AND FULL TENSOR STRESS METROLOGY FOR FLEXIBLE ELECTRONICS, PACKAGING, AND OPTOELECTRONIC APPLICATIONS: AM: ADVANCED METROLOGY	74
<i>Wojtek J. Walecki ; Wei-Chun Hung</i>	
PICOSECOND ULTRASONICS: CHARACTERIZATION OF SINGLE CRYSTAL PIEZOELECTRIC MATERIALS FOR ADVANCED RF FILTERS	78
<i>C. Hayden ; J. B. Kwon ; D. Kim ; S. Gibb ; R. Mair ; J. Dai ; X. Zeng ; P. Mukundhan</i>	
IN-LINE XPS TO QUANTIFY THE CHANGES IN INTERFACIAL LAYERS OF ADVANCED NODE GATE STACKS	84
<i>M. Medikonda ; B. Kannan ; B. Cohen ; V. Chhabra ; K. Onishi ; G. Dilllway ; A. F. Bello ; M. Klare</i>	

A NOVEL HIGH-RESOLUTION XRD APPARATUS FOR PATTERNED EPITAXIAL FILMS IN A 50PM PAD AREA WITH A CONVERGENT MICRO X-RAY BEAM.....	89
<i>Y. Ito ; H. Motono ; K. Omote ; K. Ogata ; S. Yoshihara ; N. Matsushima</i>	
STANDARDISING UTILITY SAVINGS.....	94
<i>Michael Czerniak ; Andreas Neuber</i>	
MEASURING THE WAFER TEMPERATURE IN HVM PROCESS TOOLS USING A NEW APPROACH WITH AUTOMATED WIRELESS HIGHTEMP-400 AND ETCHTEMP-SE WAFER SYSTEMS	98
<i>D. Y. Kim ; J. I. Kim ; Dinh Chu ; DongChul Hong</i>	
MICRO BUMP HEIGHT DERIVATION CONTROL WITH DYNAMIC SIZING PATTERNING.....	103
<i>C. C. Liu ; J. H. Chen ; Y. N. Hsu ; M. H. Tsai ; C. C. Hung ; R. D. Wang ; C. S. Liu ; T. H. Pan ; C. S. Chen ; K. C. Liu ; Harry Ku</i>	
MANUFACTURING APPLICATION STUDY OF CDZNT WAFERS USING AUTOMATED X-RAY METROLOGY	106
<i>W. L. She ; L. Q. Zhou ; Q. Bo ; R. Bytheway ; O. Whear ; P. Gin</i>	
FORGING BASIC ELEMENTS OF CYBER-PHYSICAL SYSTEMS IN INDUSTRY 4.0 WITH PARAMETRIC CHARACTERIZATION FOR FDC.....	111
<i>Keung Hui ; Leo Ke ; S. Y. Sheen</i>	
PARTICLE REDUCTION IN HIGH TEMPERATURE SULFURIC ACID USING PTFE MEMBRANE FILTER AND LOW PULSATION BELLOWS PUMP	117
<i>Tomoyuki Takakura ; Katsuhiko Tokuno ; Shuichi Tsuzuki ; Kenji Yamazaki ; Ai Tomotoshi ; Kazukiyo Teshima</i>	
OPTIMIZATION OF BEOL R&C MONITORING MACROS FOR ACCURATE REPRESENTATION OF CIRCUIT PERFORMANCE	121
<i>Dewei Xu ; Ravi Srivastava ; Ushasree Katakamsetty ; Ernesto Gene de la Garza ; Hyung Woo Kim ; Rod Augur ; Robert Fox</i>	
EFFECTIVE EPI PROCESS WINDOW MONITORING BY HIGH RESOLUTION MASSIVE CDU METROLOGY: TOPIC: AM (ADVANCED METROLOGY).....	124
<i>Z. Y. Chen ; T. Y. Chen ; Ido Holcman ; Bruce Tseng</i>	
OPTIMIZATION OF WET CLEAN AND ITS COST EFFECTIVENESS IN DUAL DAMASCENE 14 NM BEOL	128
<i>Asha Sharma ; Jacob Bulaga ; Srishti Agrawal ; Ravi Srivastava ; Mukesh Gogna ; Sunil Singh ; Silas Scott</i>	
ADVANCED INDUSTRIAL S/TEM AUTOMATION AND METROLOGY: BOUNDARY OF PRECISION.....	131
<i>Haiyan Tan ; Weihao Weng ; Raghav Rai ; Chris Kang ; Laurent Dumas ; Irene Brooks ; Ahmad Katnani ; Zhenxin Zhong ; Chris Hakala ; Yinggang Lu ; John Fretwell ; Timothy A. Johnson</i>	
A SYSTEMATIC APPROACH TO SECURE DATA COLLECTION ACROSS AN OEM'S FLEET OF TOOLS.....	136
<i>Doug Suerich ; Veronica Consens</i>	
ADVANTAGES OF USING BIG DATA IN SEMICONDUCTOR MANUFACTURING	139
<i>Gabe Villareal ; James Na ; Joe Lee ; Tom Ho</i>	
ENABLING 5G — A SUBSTRATE MATERIAL PERSPECTIVE: AEM, ET/ID	143
<i>Ionut Radu ; Eric Desbonnets ; Manuel Sellier ; Christophe Didier</i>	
ANODE PASSIVATION MITIGATION IN ULTRA THICK METAL PLATING	148
<i>Mark Rovereto ; Antonio Fiacco</i>	
LIQUID-METAL-JET X-RAY TECHNOLOGY FOR NANOELECTRONICS CHARACTERIZATION AND METROLOGY	151
<i>Julius Hållstedt ; Emil Espes ; Ulf Lundström ; Björn Hansson</i>	
PATTERNING CHALLENGES FOR MONOLITHIC SILICON PHOTONICS: AP/DFM: ADVANCED PATTERNING / DESIGN FOR MANUFACTURABILITY	155
<i>Colleen Meagher ; Zoey Sowinski ; Chienfan Yu ; Shuren Hu ; Karen Nummy ; Mini Modh Ghosal ; Ramya Viswanathan ; Amr Abdo ; Tim Wiltshire</i>	
HIGH DENSITY EPITAXIAL UNWANTED GROWTH AND ITS EFFECT ON PLANARIZATION IN FINFET PROCESS.....	159
<i>Pit Fee Jao ; Chia Hao Tsao ; Ludmila Popova ; Jagadeesh Yarramsetty ; Brad Chen ; Shashidhar Shintri ; Mariappan Hariharaputhiran ; Venkat Kolagunta</i>	
PROCESS QUEUE TIME CONTROL, REACTIVE OR PROACTIVE?	163
<i>Chienfan Yu ; Laura Bauman ; Vickie Jophlin-Gut ; Garrett Oakley ; Michael Carbonnell ; Zoey Sowinski ; Edward Sherwood ; Katherine Hawkins ; Ryan Kelly ; Rebekah Sheraw</i>	
CHARACTERIZATION OF SUB-10 NM FILTER CLEANLINESS BY ELECTROPHORETIC PURIFICATION AND ANALYSIS	166
<i>Makonnen M. Payne ; Rao Varanasi ; Glen W. Wildermuth ; Arthur J. Ackermann</i>	

IDENTIFYING CYCLE TIME FACTORS AND ITS RELATIVE IMPACT ON TOOLS IN SEMI-CONDUCTOR FAB USING STATISTICAL INFERENCES.....	170
<i>Atirek Wribhu</i>	
ALIGNMENT SOLUTIONS ON FBEOL LAYERS USING ASML SCANNERS: AEPM: ADVANCED EQUIPMENT PROCESSES AND MATERIALS	174
<i>Pavan Samudrala ; Gregory Hart ; Yen-Jen Chen ; Lokesh Subramany ; Haiyong Gao ; Nyan Aung ; Woong Jae Chung ; Blandine Minghetti ; Rajan Mali ; Seva Khikhlovskiy ; Pieter Heres</i>	
AIRBORNE MOLECULAR CONTAMINATION: FORMATION, IMPACT, MEASUREMENT AND REMOVAL OF NITROUS ACID (HNO₂)	180
<i>Jürgen M. Lobert ; Reena Srivastava ; Frank Belanger</i>	
REQUIREMENTS FOR FIRST-TIME-RIGHT RESPONSE IN ADVANCED MANUFACTURING	186
<i>Boyd Finlay ; Niels Rackwitz ; Brian Conerney ; Eric Warren ; David Erdmann ; Kevin Stoddard ; Alan Weber ; Thomas Scanlon</i>	
COMPUTATIONAL FLUID DYNAMICS MODELLING FOR REFINING COMPONENT DESIGN - AEM: ADVANCED EQUIPMENT AND MATERIAL PROCESSES.....	189
<i>Jack Geiger ; Ruslan Aliev ; Howard Base ; Joel Rozga ; Mounir Ibrahim</i>	
A NOVEL APPROACH TO TOOL MONITORING FOR FURNACE TOOLS WITH DYNAMIC RECIPE MANAGEMENT	193
<i>Shiladitya Chakravorty ; Chihyun Jung ; Garrett Szafman ; Jaana Rajachidambaram ; Bradley Savoy ; Satyajit Shinde</i>	
DETECTION OF THERMAL DONORS FROM ELECTRICALLY ACTIVE OXYGEN INTERSTITIALS BY OPTICAL SECOND HARMONIC GENERATION	197
<i>Ming Lei ; Jacqueline Zou ; Justin Lee ; John Changala ; Brian Larzelere</i>	
NANOPROBER IMAGE BASED LOCALIZATION TECHNIQUES FOR SOI TECHNOLOGY.....	202
<i>Sweta Pendyala ; Stephen Lucarini ; Michael Tenney</i>	
MINIMALLY INVASIVE SERVICING DESIGN.....	207
<i>Carlos Strocchia-Rivera</i>	
GAS CLUSTER ION BEAM PROCESSING FOR IMPROVED SELF ALIGNED CONTACT YIELD AT 7 NM NODE FINFET - MJ: MOL AND JUNCTION INTERFACES	208
<i>Su Chen Fan ; Sean Teehan ; Kisup Chung ; Alex Varghese ; Mark Lenhardt ; Pietro Montanini ; Spyridon Skordas ; Bala Haran ; Stan Tsai ; Ruilong Xie</i>	
ASYMMETRIC ETCHING PROFILE CONTROL DURING HIGH ASPECT RATIO PLASMA ETCH.....	211
<i>Zusing Yang ; Li-Ian Wu ; Sheng-Yuan Chang ; Yuan-Chieh Chiu ; Hong-Ji Lee ; Nan-Tzu Lian ; Tahone Yang ; Kuang-Chao Chen ; Chih-Yuan Lu ; Hayato Watanabe ; Yinhwa Cheng ; Takao Arase ; Masahito Mori</i>	
WAFER BACKSIDE CLEANING FOR DEFECT REDUCTION AND LITHO HOT SPOTS MITIGATION - DI: DEFECT INSPECTION AND REDUCTION	216
<i>Elango Balu ; Wei-Tsu Tseng ; David Jayez ; Jay Mody ; Keith Donegan</i>	
PARTICLE REDUCTION IN BACK END OF LINE PLASMA-ETCHING PROCESS - CFM: CONTAMINATION FREE MANUFACTURING.....	222
<i>Lijuan Zou ; Alex Vaghese ; Vinay Pai ; Jeffrey Shearer ; Spyridon Skordas</i>	
METAL CMP PROCESS OPTIMIZATION FOR LOW ABRASIVE SLURRY	226
<i>Subhadeep Mukherjee ; Gagan Aggarwal</i>	
RAPID YIELD RAMP USING CLOSED LOOP DFM AND OVERLAY PROCESS WINDOW QUALIFICATION FLOW	231
<i>Michael Wojtowecz ; Deborah Ryan ; Karthik Krishnamoorthy ; Nabil Azad ; Haizhou Yin ; Pietro Babighian ; Uwe Schroeder ; Mark Duggan ; Panneerselvam Venkatachalam</i>	
TOPOGRAPHY HOTSPOT-AWARE PROCESS CONTROL METROLOGY CELL INSERTION - DFM: DESIGN FOR MANUFACTURABILITY.....	234
<i>Md Rezaul Nishat ; Ushasree Katakamsetty ; Vikas Mehrotra ; Howard Landis ; Sam Nakagawa ; Gazi Huda</i>	
MODELLING PATTERN DEPENDENT VARIATIONS IN SEMI-ADDITIVE COPPER ELECTROCHEMICAL PLATING - AP/DFM: ADVANCED PATTERNING / DESIGN FOR MANUFACTURABILITY	238
<i>Christopher Lang ; Duane Boning</i>	
A MULTI-FACTORIAL APPROACH FOR MIDDLE-OF-LINE DESIGN RULE VALIDATION AND OPTIMIZATION IN 22FDX®	244
<i>Benoit Ramadout ; Deepal Wehella-Gamage ; Thomas Staiger ; Katherina Babich ; Hans-Peter Moll ; Jin Wallner ; Oliver D. Patterson</i>	
LEVERAGING FOCUS SPOT MONITORING DATA IN FEOL TO RESOLVE A HIGH IMPACT MOL DEFECT - DI: DEFECT INSPECTION AND REDUCTION	249
<i>Fauzia Khathkatay ; Chih-Chieh Huang ; Ludmila Popova ; Jongyoon Yoon ; Thomas Zalocha ; Phillip Tatti ; Krishan Gopal ; Hongliang Shen ; Ho Young Song ; Amit Gupta</i>	

REVIEW-SEM IMAGE ANALYSIS WITH K-MEANS ALGORITHM - AM: ADVANCED METROLOGY/DI: DEFECT INSPECTION	255
<i>Sandip Halder ; Dorin Cerbu ; Mohamed Saib ; Philippe Leray</i>	
INLINE SEM IMAGING OF BURIED DEFECTS USING NOVEL ELECTRON DETECTION SYSTEM - DI: DEFECT INSPECTION AND REDUCTION	259
<i>Abhinav Jain ; John G. Sheridan ; Felix Levitov ; Victor Aristov ; Shay Yasharzade ; Hoang Nguyen</i>	
ELECTRON BEAM INSPECTION: CDU DUAL-MODE INSPECTION AND LITHOGRAPHY GHOST IMAGE DETECTION	264
<i>Richard F. Hafer ; Oliver D. Patterson ; Derek McKindles ; Brian Yueh-Ling Hsieh</i>	
DESIGN BASED AUTOMATIC DEFECT CLASSIFICATION AT ADVANCED TECHNOLOGY NODES - DI: DEFECT INSPECTION AND REDUCTION	270
<i>Jay Shah ; Abhinav Jain ; Felix Levitov ; Shay Yasharzade ; John G. Sheridan ; Vu Nguyen ; Hoang Nguyen</i>	
METHOD OF PROBLEM SOLVING TO DIAGNOSE HIGH PARTICLE FAILURES DUE TO UNIQUE ROTATION STOPPING POSITION - CFM: CONTAMINATION FREE MANUFACTURING.....	276
<i>Jessica Gruss-Gifford ; Thomas Haigh ; Paul Hall ; Jean Wynne ; John Grassucci ; David O'Meara ; Josh Prendergast ; Kyle Dwyer ; Paul Higgins</i>	
TRACE METAL CONTAMINATION ANALYSIS OF WAFER EDGE AND BEVEL BY AUTOMATED VPD ICP-MS - CFM: CONTAMINATION FREE MANUFACTURING	280
<i>Vijay Chowdhury ; David Simionas ; Kiera Fu ; Janie Huang ; Peng Sun</i>	
BRUSH CLEANING EFFECT ON TUGNSTEN VOIDS DEFECT IN CHEMICAL MECHANICAL POLISHING - CFM: CONTAMINATION FREE MANUFACTURING	283
<i>Hong Jin Kim ; Bryan Egan ; Robert Solan ; Xingzhao Shi ; Ja-Hyung Han</i>	
UNCOVERING CHEMICAL QUALITY IMPROVEMENTS THROUGH A HOLISTIC APPROACH TO CHEMICAL QUALITY MANAGEMENT: CONTAMINATION FREE MANUFACTURING.....	286
<i>Nora Colligan</i>	
DETERMINING A SECURITY ROADMAP FOR THE MICROELECTRONICS INDUSTRY	291
<i>James Moyne ; Supika Mashiro ; David Gross</i>	
APPLYING THE DISCRETE NETWORK DESIGN PROBLEM (DNBP) FOR DESIGNING AMHS LAYOUTS IN SEMICONDUCTOR FABs	295
<i>Gerrit M. Kortus ; Martin Däumler ; Thorsten Schmidt</i>	
DEEP REINFORCEMENT LEARNING FOR SEMICONDUCTOR PRODUCTION SCHEDULING.....	301
<i>Bernd Waschneck ; André Reichstaller ; Lenz Belzner ; Thomas Altenmüller ; Thomas Bauernhansl ; Alexander Knapp ; Andreas Kyek</i>	
OPPORTUNITIES, CHALLENGES AND USE CASES OF DIGITIZATION WITHIN THE SEMICONDUCTOR INDUSTRY	307
<i>Germa Schneider ; Sophia Keil ; Gerhard Luhn</i>	
SHORTEST PATH CD MEASUREMENT USING CONTOUR EXTRACTION	313
<i>Oliver D. Patterson ; Bart Seefeldt ; Wan-Hsiang Liang ; Haokun Hu ; Joan Chen ; Yu-Chi Su ; Hsiang Ting Yeh ; Pengcheng Zhang</i>	
INLINE DETECTION FOR FINFET GATE POLY FOOTING USING E-TILT METROLOGY	320
<i>Xiaoxiao Zhang ; Mert Karakoy ; Kejia Wu ; Zhuangfei Chen ; Zhenhua Ge ; Navi Krishnan ; Amit Siany ; Shimon Levi ; Ishai Schwarzband ; Roman Kris</i>	
CD-TEM: CHARACTERIZING IMPACT OF TEM SAMPLE PREPARATION ON CD METROLOGY	324
<i>Anne Kenslea ; Chris Hakala ; Zhenxin Zhong ; Yinggang Lu ; John Fretwell ; Jack Hager ; Chris Kang ; Haiyan Tan ; Weihao Weng ; Laurent Dumas ; Irene Brooks</i>	
APPLICATION OF SCATTEROMETRY-BASED MACHINE LEARNING TO CONTROL MULTIPLE ELECTRON BEAM LITHOGRAPHY - AM: ADVANCED METROLOGY	328
<i>Nivea Figueiro ; Francisco Sanchez ; Roy Koret ; Michael Shifrin ; Yoav Etzioni ; Shay Wolfling ; Matthew Sendelbach ; Yoann Blancquaert ; Thibault Labbaye ; Guido Rademaker ; Jonathan Pradelles ; Lucie Mourier ; Stephane Rey ; Laurent Pain</i>	
HETEROGRANULAR MULTIVARIATE ANALYTICS FOR DETECTING AND CONTROLLING THE ROOT CAUSES OF THE MISMATCHING MACHINES IN SEMICONDUCTOR MANUFACTURING.....	334
<i>Aabir Chouichi ; Jakey Blue ; Claude Yugma ; Francois Pasqualini</i>	
ON THE INCREASE OF THE CONTROLLABILITY MATRIX RANK IN NON-THREADED RUN-TO-RUN CONTROL	340
<i>Taki Eddine Korabi ; Guillaume Graton ; El Mostafa El Adel ; Mustapha Ouladsine ; Jacques Pinaton</i>	

ADVANCED RUN-TO-RUN CONTROLLER IN SEMICONDUCTOR MANUFACTURING WITH REAL-TIME EQUIPMENT CONDITION - APC: ADVANCED PROCESS CONTROL; AM: ADVANCED METROLOGY.....	346
<i>Wei-Ting Yang ; Jakey Blue ; Agnès Roussy ; Marco Reis ; Jacques Pinaton</i>	
THE LONG JOURNEY FROM STANDARDISATION TO FULL AUTOMATION OF A MATURE 200 MM FAB.....	353
<i>Harald Heinrich ; Arthur Deutschländer</i>	
ENHANCING FLEXIBILITY AND ROBUSTNESS OF SEMICONDUCTOR PRODUCTION BY USING AUTONOMOUS MODULAR SERVICES.....	359
<i>Sophia Keil ; Germar Schneider ; Mathias Kuttig ; Arthur Deutschländer ; Arnold Lange ; Harald Heinrich</i>	
HYBRID CLEAN FOR APPLIED MATERIALS 200MM CENTURA REDUCED PRESSURE EPI APPLICATION	365
<i>Thomas Ackermann ; Boris Binder ; Jenny Schmidt ; Joerg Radecker ; Carlos Caballero</i>	
INNOVATIVE USE OF FA TECHNIQUES SCM AND OBIRCH ALONG WITH TCAD TO RESOLVE JUNCTION SCALING ISSUES AT ADVANCED TECHNOLOGY NODES	370
<i>Gregory Johnson ; Jochonia Nxumalo ; Ankur Arya ; Jeffrey Johnson ; Qun Gao ; Brian Greene</i>	
IMPACT OF SCRIBE LINE (KERF) DEFECTIVITY ON WAFER YIELD	374
<i>Fauzia Khatkhatay ; Ludmila Popova ; Chih-Chieh Huang ; Hye Jin Lee ; Yining Zang ; Ki Cheol Ahn ; ChiaHao Tsao ; Tae Hoon Lee ; Thirukumaran Mahalingam ; Haiting Wang ; Amit Gupta ; Julie Lee ; Towshif Ali ; Joseph Matthew Kaule</i>	
BARE WAFER ANALYSIS FOR WET CLEANING EFFICIENCY — THE IMPACT OF CLASSIFICATION AND SENSITIVITY	379
<i>Kay Wendt ; Fabian Wilbers ; Jochen Ruth ; Christophe Lorant ; Frank Holsteys ; John Newby ; Gerhard Bast ; Vignesh Sundar</i>	
GROSS SUBSTRATE DEFECTS CAUSED BY THERMAL GRADIENTS IN HIGH TEMPERATURE FURNACE PROCESSES.....	382
<i>Fauzia Khatkhatay ; Satish Singh ; Stewart Wenner ; Loyd Perrymore ; Danda Acharya ; Carlos Chacon ; Amit Gupta</i>	
STI HARP GAP-FILL THICKNESS UNIFORMITY IMPROVEMENT FOR 14NM NODES.....	386
<i>Minrui Wang ; Hui Kim ; Yang Bum Lee ; Francis Fonda ; Jeremy Lansford ; Jim Martiniano ; Harold Carter</i>	
THERMAL LIMITS OF ELECTROLESS NI IMMERSION AU (ENIG) DURING SOLDER REFLOW PROCESSING: ADVANCED MATERIALS	390
<i>David Rhodes ; Saurabh Chowdury ; Sung Yea ; Jose Guerrero ; Peter Smith ; Nicholas Bushnell</i>	
STUDY OF TITANIUM NITRIDE UNDERLAYER PROPERTIES AND ITS INFLUENCE ON TUNGSTEN GROWTH	395
<i>Shanti Pancharatnam ; Jean Wynne ; Gauri Karve ; Adra V. Carr ; Brock Mendoza ; Lisamarie White ; Gabriel Rodriguez ; Scott De Vries ; Wei Wang</i>	
FULLY AUTOMATED IN-LINE OPTICAL TEST SYSTEM: ADVANCED MATERIALS & PHOTONICS	399
<i>Shuren Hu ; Andy Stricker ; Kate McLean ; Calvin Ma ; Subharup Gupta Roy ; Dean Percy ; John Cartier ; David Clark ; Raymond Van Roijen ; Bart Green ; Kevin Dezfulian ; Louis Medina ; John Ferrario ; David Riggs ; Ken Giewont</i>	
Author Index	