

UCPSS 2016

**13th International Symposium on
ULTRA CLEAN PROCESSING of
SEMICONDUCTOR SURFACES**

PROGRAMME



Knokke Heist – Belgium, 11-14 September 2016

Monday 12 September

09.00 – 09.40		OPENING SESSION & KEYNOTE PRESENTATION
09.40 – 10.40	1A	FEOL: Surface Chemistry Group IV
10.40 – 11.10		Coffee Break
11.10 – 12.00		POSTER ANNOUNCEMENT SESSION 1
12.00 – 13.50		Lunch Break
13.50 – 15.00	1B	SURFACE CHEMISTRY GROUP IV
15.00 – 16.00	2	FEOL: SURFACE CHEMISTRY: III-V COMPOUND SEMICONDUCTORS
16.00 – 16.30		Coffee Break
16.30 – 17.30	3	FEOL ETCHING
17.30 – 18.00		POSTER ANNOUNCEMENT SESSION 2
18.00		POSTER SESSION / RECEPTION

Tuesday 13 September

08.30 – 10.00	4	WETTING AND DRYING
10.00 – 10.30		Coffee Break
10.30 – 11.10	4	WETTING AND DRYING (continued)
11.10 – 11.50	5	MECHANICAL FLUID EFFECTS, NANO PARTICLES
11.50 – 12.30	6	FEOL: PHOTO RESIST REMOVAL / GENERAL CLEANING
12.30 – 13.40		Lunch Break
13.40 – 15.40	7	INTERCONNECT CLEANING
15.40 – 16.00		Coffee Break
16.00 – 17.20	7	INTERCONNECT CLEANING (continued)
19.00		Conference Dinner

Wednesday 14 September

09.00 – 09.40	7	INTERCONNECT CLEANING (continued)
09.40 – 10.00	8	SESSION 8 - 3D
10.00 – 10.30		Coffee Break
10.30 – 11.30	9	PHOTO VOLTAIC
11.30 – 12.10	10	NON-WAFER CLEANING/ MASK CLEANING
12.10 – 13.40		Lunch Break
13.40 – 14.30	11	METROLOGY AND CONTAMINATION SPECIFICATION
14.30 – 15.30	12	CONTAMINATION CONTROL
15.30		STUDENT PAPER EVALUATION & CONCLUSION

Monday 12 September

OPENING SESSION & KEYNOTE PRESENTATION 09.00 – 09.40

Chair: Paul Mertens

Co-Chair: Jerzy Ruzylo

09.00 Welcome & Opening

Paul Mertens

imec, Belgium

09.10 Keynote: Future memory Process & Equipment (invited)

Kuntack Lee

Samsung, Korea

SESSION 1A – FEOL: Surface Chemistry Group IV 09.40 – 10.40

Chair: Jerzy Ruzylo

Co-Chair: Kurt Wostyn

09.40 1.1 - Wet selective SiGe etch to enable Ge nanowire formation

Farid Sebaai¹, Liesbeth Witters¹, Frank Holsteyns¹, Kurt Wostyn¹, Jens Rip¹, Yoshida Yukifumi², Ruben Lieten³, Steven Bilodeau⁴ and Emanuel Cooper⁴

¹imec, Belgium

²SCREEN Semiconductor Solutions Co, Japan

³Entegris, Germany

⁴Entegris, USA

10.00 1.2 - Surface passivation of new channel materials utilizing hydrogen peroxide and hydrazine gas

Dan Alvarez Jr.¹, Jeffrey J. Spiegelman¹, Andrew C. Kummel², Mary Edmonds², Kasra Sardashti², Steven Wolf² and Russell Holmes¹

¹RASIRC Inc., USA

²University of California, USA

10.20 1.3 - Tris(trimethylsilyl)germane (Me₃Si)₃GeH: A molecular model for sulfur passivation of Ge(111) surfaces (student contribution)

Gilbert Okorn¹, Roland Fischer¹, Beate Steller¹, Philipp Engesser² and Harald Okorn-Schmidt²

¹Institute for Inorganic Chemistry, Graz University of Technology, Austria

²LLRC OG, Austria

10.40 Coffee Break

POSTER ANNOUNCEMENT SESSION 1 11.10 – 12.00

Chair: Alessandri Mauro

Co-Chair: Marc Meuris

3 min. Per poster

P1.1 - Surface preparation quality before epitaxy

Philippe Garnier

STMicroelectronics, France

P1.2 - Study of oxygen concentration in TMAH solution for improvement of sigma-shaped wet etching process

Yonggen He¹, Huanxin Liu¹, Jialei Liu¹, Jingang Wu¹, Christian Haigermoser², Feng Liu², Meisheng Zhou² and Wei Lu²

¹Semiconductor Manufacturing, China

²Lam Research, China

P1.3 - Silicon surface passivation in HF solutions for improved gate oxide reliability

Philippe Garnier
STMicronics, France

P1.4 - Metrology for high selective silicon nitride etch

Chuannan Bai, Guang Liang and Eugene Shalyt
ECI Technology, USA

P1.5 - Study on the etching selectivity of oxide films in dry cleaning process with HF, NF₃ and H₂O (student contribution)

Sung-Min Kang^{1,2}, Tae-Hyung Kim² and Taesung Kim¹
¹SKKU Advanced Institute of Nanotechnology, Korea
²Samsung Electronics Co., Korea

P1.6 - Titanium nitride hard mask removal with selectivity to tungsten in FEOL

Hsing-Chen Wu¹, Sheng-Hung Tu¹, Min-Chieh Yang¹ and Emanuel Cooper²
¹Entegris Inc., Taiwan
²Entegris Inc., USA

P1.7 - Chemical infiltration through Deep UV photoresist

Philippe Garnier and Marc Neyens
STMicronics, France

P1.8 - Efficient photoresist residue removal with 172nm excimer radiation

Andreas Schäfer¹ and Dr. Hartwig Wiesmann²
¹Ushio Deutschland GmbH., Germany
²Ushio Europe B.V., The Netherlands

P1.9 - Toward CO₂ beam cleaning of 20-nm particles in atmospheric pressure (student contribution)

Joonoh Kim¹, Jae Hong Lee¹, Seungho Kim¹, Jinkyu Kim², Kihoon Choi² and Ho-Young Kim^{1,3}
¹Seoul National University, Korea
²SEMES Co., Ltd., Korea
³Seoul National University, Korea

P1.10 - A Study on the Electrostatic Discharge(ESD) Defect in SOH Mask Pattern Cleaning

Dae-wan KO, Tae-ho HWANG, Sok-hyung HAN, Chang-hyun KIM and Byung-sul RYU
Samsung Electronics, Korea

P1.11 - Post-CMP Cleaners for Tungsten at Advanced Nodes

Ruben R. Lieten¹, Daniela White², Thomas Parson², Shining Jenq³, Don Frye², Michael White², Lieve Teugels⁴ and Herbert Struyf⁴
¹Entegris, GmbH, Germany
²Entegris, Inc, USA
³Entegris, Inc, Taiwan
⁴Imec, Belgium

P1.12 - Removal of bull's eye signature by optimizing wet cleans recipe

Dhiman Bhattacharyya, Pranesh Muralidhar and Mark Conrad
GLOBALFOUNDRIES, USA

P1.13 - Evaluation of post etch residue cleaning solutions for the removal of TiN hardmask after dry etch of low-k dielectric materials on 45 nm pitch interconnects

Makonnen Payne¹, Steve Lippy¹, Ruben Lieten², Els Kesters³, Quoc T. Le³, Gayle Murdoch³, Victor V. Gonzalez³ and Frank Holsteyns³
¹Entegris, USA
²Entegris, Germany
³imec, Belgium

P1.14 - TiN metal hardmask etch residues removal with AlN etch

Hua Cui

DuPont Electronics & Communications, USA

P1.15 - High throughput wet etch solution for BEOL TiN removal

Chia-Jung Hsu¹, Chieh-Ju Wang¹, Sheng-Hung Tu¹, Makonnen Payne², Emanuel Cooper² and Steven Lippy²

¹Entegris, Inc., Taiwan

²Entegris, Inc., USA

P1.16 - Low undercut Ti etch chemistry for Cu bump pillar under bump metallization wet etch process

Simone Capecchi¹, Tanya Atanasova¹, Reiner Willeke¹, Michael Parthenopoulos², Christian Pizzetti³ and Jerome Daviot³

¹GLOBALFOUNDRIES, Germany

²Fraunhofer IZM, ASSID, Germany

³Technic France, France

P1.17 Oxidation of Si surfaces: Effect of ambient air and water treatments on surface charge and interface state density

Heike Angermann¹, Patrice Balamou², Wenjia Lu¹, Lars Korte¹, Caspar Leendertz¹ and Bert Stegemann²

¹Institute of Silicon Photovoltaics, Germany

²HTW Berlin - University of Applied Sciences Berlin, Germany

12.00 Lunch Break

SESSION 1B – SURFACE CHEMISTRY GROUP IV

13.50 – 15.00

Chair: Anthony Muscat

Co-Chair: Glen Gale

13.50 1.4 - Applications for surface engineering using atomic layer etching (invited)

Eric A. Joseph¹, Sebastian Engelmann¹, Robert Bruce¹, Dominik Metzler^{1,2}, Nathan Marchack¹, John Papalia¹ and Hiroyuki Miyazoe¹

¹IBM T.J. Watson Research Center, USA

²SUNY Polytechnic Institute, USA

14.20 1.5 - The effect of rinsing a Germanium surface after wet chemical treatment

Yukifumi Yoshida^{1,2}, Hiroaki Takahashi¹, Masanobu Sato¹, Jim Snow¹, Farid Sebaai² and Frank Holsteyns²

¹SCREEN Semiconductor Solutions Co, Japan

²imec, Belgium

14.40 1.6 - Effect of dilute hydrogen peroxide in Ultrapure water on SiGe epitaxial process

Toru Masaoka¹, Nobuko Gan¹, Yu Fujimura¹, Yuichi Ogawa¹, Kurt Wostyn², Antoine Pacco², Yukifumi Yosida³ and Frank Holsteyns²

¹Kurita Water Industries Ltd., Japan

²imec, Belgium

³SCREEN Semiconductor Solutions Co., Japan

SESSION 2 - FEOL: SURFACE CHEMISTRY: III-V COMPOUND SEMICONDUCTORS 15.00 – 16.00

Chair: Harald Okorn-Schmidt

Co-Chair: Joel Barnett

- 15.00** **2.1 - Towards atomic-layer-scale processing of high mobility channel materials in acidic solutions for N5 and N7 technology nodes**
 Dennis H. van Dorp¹, Sophia Arnauts¹, Graniel Abrenica^{1,2} and Frank Holsteyns¹
¹imec, Belgium
²Katholieke Universiteit Leuven, Belgium
- 15.20** **2.2 - Comparison of the chemical passivation of GaAs, In_{0.53}Ga_{0.47}As, and InSb with 1-Eicosanethiol**
 Yissel Contreras, Pablo Mancheno-Posso and Anthony J. Muscat¹
¹The University of Arizona, USA
- 15.40** **2.3 - Digital etching of GaAs materials: Comparison of oxidation treatments (student contribution)**
 Mickaël Rebaud¹, Marie-Christine Roure¹, Virginie Enyedi¹, Lukasz Borowik¹, Eugénie Martinez¹, Laura Toselli¹ and Pascal Besson¹
¹Uni. Grenoble Alpes, France
 CEA, LETI, MINATEC Campus, France

16.00 **Coffee Break**

SESSION 3 – FEOL ETCHING

16.30 – 17.30

Chair: Alessandri Mauro

Co-Chair: Naser Belmiloud

- 16.30** **3.1 - Selective etching of silicon oxide and nitride with low oxide etching rate**
 Hsing-Chen Wu¹, Sheng-Hung Tu¹, Min-Chieh Yang¹ and Emanuel Cooper²
¹Entegris Inc., Taiwan (R.O.C.)
²Entegris Inc., USA
- 16.50** **3.2 - Analysis of Si wet etching effect on wafer edge**
 Suguru Saito, Atsushi Okuyama, Kenji Takeo, Yoshiya Hagimoto and Hayato Iwamoto
 Sony Corporation, Japan
- 17.10** **3.3 - Thin layer etching of silicon nitride: Comparison of downstream plasma, liquid HF and gaseous HF processes for selective removal after light ion implantation**
 Olivier Pollet¹, Nicolas Posseme¹, Vincent Ah-Leung¹ and Maxime Garcia Barros²
¹CEA, LETI, MINATEC Campus, France
²ST Microelectronics, France

POSTER ANNOUNCEMENT SESSION 2

17.30 – 18.00

Chair: Marc Meuris

Co-Chair: Alessandri Mauro

P2.1 - Atomic resolution quality control for Fin oxide recess by atomic resolution profiler

Tae-Gon Kim^{1,2}, Heon-Yul Ryu², Karine Kenis¹, Ah-jin Jo³, Sang-Joon Cho³, Sang-il Park³, Sebastian Schmidt⁴ and Bernd Irmer⁴

¹imec, Belgium

²Hanyang University, South Korea

³Park Systems, South Korea

⁴Nanotools GmbH, Germany

P2.2 - Specification of trace metal contamination for image sensors

Paul W. Mertens, Simone Lavizzari and Stefano Guerrieri

imec, Leuven

P2.3 - Quantitative analysis of trace metallic contamination on III-V compound semiconductor surfaces

Koichiro Saga and Rikiichi Ohnob

Sony Corporation, Japan

P2.4 - Ultra-trace sulfate ion removal on photomasks for haze reduction

Eric Guo¹, Crystal Wang¹, Sandy Qian¹, Mars Wang¹, Harry Zhang¹, Keanu Wu¹, Jian Shen² and Wei Jiang², Fei Xu²

¹Semiconductor Manufacturing International Corporation, China

²Changzhou Ruize Microelectronics, Co., Ltd., China

P2.5 - Developments for physical cleaning sample with high adhesion force particles and direct measurement of its removal force (student contribution)

Emu Tokuda¹, Toshiyuki Sanada¹, Futoshi Iwata¹, Chikako Takato², Hirokuni Hiyama² and Akira Fukunaga²

¹Shizuoka University, Japan

²Ebara Corporation, Japan

P2.6 - Contamination control for wafer container used within 300 mm manufacturing for power microelectronics

Germar Schneider¹, Thi Quynh Nguyen², Matthias Taubert¹, Julien Bounouar², Catherine Le Guet², Andreas Leibold³, Helene Richter³, Markus Pfeffer³

¹Infineon Technologies, Germany

²Pfeiffer Vacuum SAS, France

³FhG IISB, Germany

P2.7 - Characterization of cavitation in a single wafer or photomask cleaning tool

Xi Chen¹, Petrie Yam¹, Manish Keswani², Nagaya Okada³ and Claudio I. Zanelli¹

¹Onda Corporation, USA

²University of Arizona, USA

³Honda Electronics Ltd., Japan

P2.8 - Inline FOUP Cleaner - The new type FOUP cleaner for the next generation

Gwon Sagong^{1,3}, Kwang-bong Lee², Byoung-jun Lee² and Geunmin Choi²

¹Hanseo University, Korea

²SK hynix, Korea

³ISTe, South Korea

18.00 Poster Session/Reception

Tuesday 13 September

SESSION 4 – WETTING AND DRYING

08.30 – 10.00

Chair: Soichi Nadahara

Co-Chair: Kazuma Mawatari

- 08.30** **4.1 - Extended-nano fluidic devices and the unique liquid properties (invited)**
Kazuma Mawatari and Takehiko Kitamori
The University of Tokyo, Japan
- 09.00** **4.2 - Deep trench isolation and through silicon via wetting characterization by high-frequency acoustic reflectometry (student contribution)**
Christophe Virgilio¹, Lucile Broussous², Philippe Garnier², Julien Carlier³, Pierre Campistron³, Vincent Thomy⁴, Malika Toubal³, Pascal Besson⁴, Laurence Gabette⁴ and Bertrand Nongaillard³
¹Université de Valenciennes et du Hainaut-Cambrésis, France
²STMicroelectronics, France
³Institute of Electronics, Microelectronics and Nanotechnology, France
⁴CEA/LETI - Minattec, France
- 09.20** **4.3 - Pattern collapse of high-aspect-ratio silicon nanostructures - A parametric study (student contribution)**
Nandi Vrancken^{1,2}, Guy Vereecke², Stef Bal³, Stefanie Sergeant⁴, Geert Doumen², Frank Holsteyns², Herman Terryn¹, Stefan de Gendt² and XiuMei Xu²
¹Vrije Universiteit Brussel, Belgium
²imec, Belgium
³KU Leuven, Belgium
⁴UC Leuven-Limburg, Belgium
- 09.40** **4.4 - Influence of CO₂ gas atmosphere on the liquid filling of superhydrophobic nanostructures**
Guy Vereecke¹, Haroen Debruyne², XiuMei Xu¹, Frank Holsteyns¹ and Stefan De Gendt^{1,3}
¹imec, Belgium
²Katholieke Hogeschool Leuven, Belgium
³Katholieke Universiteit Leuven, Belgium
- 10.00** **Coffee Break**
- 10.30** **4.5 - Some critical issues in pattern collapse prevention and repair**
XiuMei Xu¹, Nandi Vrancken^{1,2}, Guy Vereecke¹, Samuel Suhard¹, Geoffrey Pourtois¹ and Frank Holsteyns¹
¹imec, Belgium
²VUB, Belgium
- 10.50** **4.6 - Watermark-free and efficient spray clean on hydrophobic surface with single-wafer technology**
Naser Belmiloud¹ and Nilesh Kenkare²
¹Screen SPE Germany, Germany
²Globalfoundries, Germany

SESSION 5 - MECHANICAL FLUID EFFECTS, NANO PARTICLES	11.10 – 11.50
<i>Chair: Antoine Pacco</i>	
<i>Co-Chair: Ara Philipossian</i>	

- 11.10** **5.1 - Measurement of the frictional force between PVA roller brushes and semiconductor wafers with various films immersed in chemicals (student contribution)**
Kenya Nishio¹, Toshiyuki Sanada¹, Satomi Hamada², Hirokuni Hiyama³ and Akira Fukunaga²
¹Shizuoka University, Japan
²Ebara Corporation, Japan
³Ebara Corporation, Japan
- 11.30** **5.2 - Liquid cell platform to directly visualize bottom-up assembly and top-down etch processes inside TEM**
Zainul Aabdin¹, XiuMei Xu⁵, Utkarsh Anand¹, Frank Holsteyns² and Utkur Mirsaidov¹
¹National University of Singapore, Singapore
²imec, Belgium

SESSION 6 - FEOL: PHOTO RESIST REMOVAL / GENERAL CLEANING	11.50 – 12.30
<i>Chair: Sally-Ann Henry</i>	
<i>Co-Chair: Steven Verhaverbeke</i>	

- 11.50** **6.1 - Middle of Line (MoL) cleaning challenges in sub-20nm node device manufacturing**
SherJang Singh¹, Pranesh Muralidhar¹, Samuel Mallabar¹ and Silas Scott¹
¹GLOBALFOUNDRIES US Inc., USA
- 12.10** **6.2 - Characterization and development of high dose implanted resist stripping processes (student contribution)**
Marion Croisy^{1,2,3}, Cécile Jenny¹, Claire Richard¹, Denis Guiheux¹, Alain Campo², Erwine Pargon³ and Nicolas Possémé²
¹STMicroelectronics, France
²CEA-Leti, France
³CNRS-LTM, Université Grenoble Alpes, France

12.30 **Lunch Break**

SESSION 7 - INTERCONNECT CLEANING	13.40 – 17.20
<i>Chair: Trace Hurd</i>	
<i>Co-Chair: Lucile Broussous</i>	

- 13.40** **7.1 - Molecular simulation contribution to the characterization of process induced damages on porous low-k materials (invited)**
Lucile Broussous¹, Matthieu Lépinay^{1,2,3}, Benoit Coasne⁴, Christophe Licitra², François Bertin², Vincent Rouessac³ and André Ayrat³
¹STMicroelectronics, France
²Univ. Grenoble Alpes, France
³Institut Européen des Membranes, France
⁴Laboratoire Interdisciplinaire de Physique (LIPhy), France
- 14.10** **7.2 – Adventures and advances in selective deposition of dielectrics (invited)**
David Thompson¹, Mark Saly, Jeffrey Anthis, Ben Schmiede, Feng Liu, Bhaskar Bhuyan
¹Applied Materials, USA

- 14.40** **7.4 - Characterization of etch residues generated on damascene structures**
Quoc Toan Le¹, Els Kesters¹, Ilse Hoflijk¹, Thierry Conard¹, Mary Shen², Simon Braun², Yeny Burk² and Frank Holsteys¹
¹imec, Belgium
²BASF, Germany
- 15.00** **7.5 - Optimization of Cu/Low-k dual damascene post-etch residue and TiN hard mask removal**
Alexander Kabansky¹, Glenn Westwood², Samantha Tan¹, Frederic Kovacs¹, David Lou¹, Joe Han¹, Gerardo Delgadino¹ and H. W. Chang¹
¹Lam Research Corporation, USA
²Avantor Performance Materials, USA
- 15.20** **Coffee Break**
- 15.40** **7.6 - Impact of dissolved oxygen in dilute HF solution on material etch**
Els Kesters¹, Akihisa Iwasaki², Quoc Toan Le¹ and Frank Holsteys¹
¹imec vzw, Belgium
²Screen, Belgium
- 16.00** **7.7 - The effect of inhibitors on Co corrosion in alkaline post Cu-CMP cleaning solutions**
Pascal Berar, Ping Hsu¹, Paul R. Bernatis², Kevin Huang¹ and Chi Yen¹
¹EKC Technology, DuPont Electronics & Communications, Taiwan
²EKC Technology, DuPont Electronics & Communications, USA
- 16.20** **7.8 - Oxygen control for wet clean process on single wafer platform**
Lucile Broussous¹, Kevin Hoarau¹, Come de Buttet² and Stephane Zoll¹
¹STMicroelectronics, France
²Univ. Grenoble Alpes, France
- 16.40** **7.9 - Study of TiW conditioning through different wet and dry treatments to promote ni electroless growth**
Ivan Venegoni¹, Fabio Scimè¹, Enrica Ravizza¹, Simona Spadoni¹, Francesco Pipia¹, Paolo Colpani¹, Mauro Alessandri¹
¹STMicroelectronics, Italy
- 19.00** **Conference Dinner**

Wednesday 14 September

SESSION 7 - INTERCONNECT CLEANING (continued)

09.00 – 09.40

Chair: Ara Philipossian

Co-Chair: Evelyn Kennedy

- 09.00** **7.10 - Post CMP wet cleaning influence on Cu hillocks**
Annamaria Votta¹, Francesco Pipia¹, Luisito Livellara¹, Manuela Caminati¹, Simona Spadoni¹, Enrica Ravizza¹, Salvatore Grasso¹, Maddalena Bollin¹, Maurizio Moroni¹, Mauro Alessandri¹, Paolo Colpani¹
¹STMicroelectronics, Italy
- 09.20** **7.11 - Minimizing wafer surface charging for single-wafer wet cleaning for 10 nm and beyond**
Ken-ichi Sano, Rafal Dylewicz, Xia Man, David Mui, Ji Zhu and Mark Kawaguchi
 Lam Research Corp., USA

SESSION 8 - 3D

09.40 – 10.00

Chair: Ara Philipossian

Co-Chair: Evelyn Kennedy

- 09.40** **8.1 - Silica formation during etching of silicon nitride in phosphoric acid**
Derek W. Bassett¹ and Antonio L. P. Rotondaro¹
¹Tokyo Electron America, USA

10.00 Coffee Break

SESSION 9 - PHOTO VOLTAIC

10.30 – 11.30

Chair: Amada Montesdeoca

Co-Chair: Joachim John

- 10.30** **9.1 - Surface optimization of random pyramid textured silicon substrates for improving heterojunction solar cells**
Bert Stegemann¹, Jan Kegel^{1,2}, Lars Korte² and Heike Angermann²
¹HTW Berlin - University of Applied Sciences Berlin, Germany
²Helmholtz Center Berlin for Materials and Energy (HZB), Germany
- 10.50** **9.2 - 'Just-clean-enough': Optimization of wet chemical cleaning processes for crystalline silicon solar cells**
Michael Haslinger¹, Marton Soha², Sofie Robert¹, Martine Claes¹, Paul W. Mertens¹ and Joachim John¹
¹imec, Belgium
²University of Debrecen, Hungary
- 11.10** **9.3 - Progress in cleaning and wet processing for kesterite thin film solar cells**
Bart Vermang^{1,2}, Aniket Mule^{1,3}, Nikhil Gampa^{1,4}, Sylvester Sahayaraj^{1,2}, Samaneh Ranjbar^{1,5}, Guy Brammertz^{1,6}, Marc Meuris^{1,6} and Jef Poortmans^{2,6}
¹imec, Belgium
²KU Leuven, Belgium
³ETH Zurich, Switzerland
⁴Université Claude Bernard Lyon 1, France
⁵Universidade de Aveiro, Portugal
⁶Hasselt University, Belgium

SESSION 10 - NON-WAFER CLEANING/ MASK CLEANING	11.30 – 12.10
<i>Chair: Kuntack Lee</i>	
<i>Co-Chair: Takeshi Hattori</i>	

11.30 10.1 - Optimization of EUV reticle cleaning by evaluation of chemistries on wafer-based mimic test structures

Antoine Pacco¹, Davide Dattilo², Rik Jonckheere¹, Jens Rip¹, Uwe Dietze³, Jens Kruemberg² and Frank Holsteyns¹

¹imec, Belgium

²SUSS MicroTec Photomask Equipment GmbH & Co. KG, Germany

³SUSS MicroTec Inc., USA

11.50 10.2 - 172nm excimer radiation as a technology accelerator for bio-electronic applications

Andreas Schäfert¹ and Dr. Hartwig Wiesmann²

¹Ushio Deutschland GmbH., Germany

²Ushio Europe B.V, The Netherlands

12.10 Lunch Break

SESSION 11 - METROLOGY AND CONTAMINATION SPECIFICATION	13.40 – 14.30
<i>Chair: Marc Meuris</i>	
<i>Co-Chair: Koichiro Saga</i>	

13.40 11.1 - Electrical characterization of as-processed semiconductor surfaces (invited)

Jerzy Ruzyllo and Patrick J. Drummond

Penn State University, USA

14.10 11.2 - Metal removal efficiency in high aspect ratio structures

Philippe Garnier¹ and Herve Fontaine²

¹STMicroelectronics Crolles2, France

²Univ. Grenoble Alpes, France

SESSION 12 - CONTAMINATION CONTROL	14.30 – 15.30
<i>Chair: Koichiro Saga</i>	
<i>Co-Chair: Michael Haslinger</i>	

14.30 12.1 - A mathematical model forecasting HF adsorption onto Cu-coated wafers as a function of the airborne concentration and moisture

Fernando Herrán¹, Hervé Fontaine¹, Paola González-Aguirre^{1,2}, Carlos Beitia¹, Jim Ohlsen² and Jorgen Lundgren²

¹Univ. Grenoble Alpes, France

²Entegris, France

14.50 12.2 - Advanced cryogenic aerosol cleaning: Small particle removal and damage-free performance

Chimaobi Mbanaso¹, Jeffery W. Butterbaugh¹, David Scott Becker¹, Wallace P. Printz², Antonio L. P. Rotondaro², Derek W. Bassett², Gregory P. Thomes¹, Brent D. Schwab¹, Christina Ann Rathman¹ and Jeffrey M. Lauerhaas¹

¹TEL FSI, USA

²Tokyo Electron America, USA

- 15.10** **12.3 - Electrolyzed water for efficient metal removal**
John Oshinowo¹, Ann- Kristine Neelsen¹, Matthias Fryda¹, Lutz Rebstock² and Ulrich
Quarti²
¹CONDIAS GmbH, Germany
²BROOKS Automation GmbH, Germany

STUDENT PAPERS	15.30 – 15.50
<i>Chair: Kurt Wostyn</i>	
<i>Co-Chair: Paul Mertens</i>	

- 15.30** **Outstanding Student Paper Announcement**
Kurt Wostyn
imec, Belgium

- 15.50** **Conclusion**
Paul Mertens
imec, Belgium