

Monday, May 12th 2014

9.00 Welcome – S. Barnola, Chairman

Session 1: Exotic materials and processes

Chair: S. Barnola, CEA-Leti

09:20 J. P. Chang - Invited

Department of Chemical and Biomolecular Engineering, University of California, Los Angeles

The Challenges and Opportunities in Plasma Etching of Functionally Enhanced Complex Material Systems

**10:00 R. Chanson^a, E. Pargon^a, M. Darnon^a, C. Petit-Etienne^a, M. Fouchier^a,
B. Glueck^b, P. Brianceau^b, S. Barnola^b**

^aUniv. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France

^bCEA-leti 17 rue des Martyrs, F-38054 Grenoble Cedex, France

Reactor wall plasma cleaning processes after InP etching in Cl₂/CH₄/Ar ICP discharge

10:20 Coffee break

Chair: E. Altamirano Sanchez, IMEC

10:40 P. Azoley, S. Renard, S. Louwers - Invited

Tronics Microsystems, 98 rue du Pré de l'Horme, Crolles, 38926, France

Submicron Technologies at Tronics: Evolution of the patterning technologies for MEMS

**11:20 N. Gosset^{a*}, J. Ladroue^b, T. Tillocher^a, P. Lefauchaux^a, M. Boufnichel^b,
R. Dussart^a**

^aGREMI, 14 rue d'Issoudun, Orléans, 45067, France

^bSTMicronics, 16 rue Pierre et Marie Curie, Tours, 37100, France

Effect of surface fluorination on GaN deep dry etching defects

**11:40 G. Mannaert^a, N. E. Posthum^a, B. De Jaeger^a, V. Paraschiv^b, M. Van Hove^a,
K. Xu^a, S. Decoutere^a**

^aImec, Kapeldreef 75, Leuven, B-3001, Belgium

^bS.C. Etch Tech Solutions, Str. Oancea 3 B1 D10 Apt.2, Iasi, Romania

Etch development for E-mode GaN power HEMT fabrication

12:00 Lunch break

Session 2: Modeling and simulations

Chair: M. Funk, Tokyo Electron Limited

13:30 S.-H. Song, Y. Zhang, M. D. Logue, P. Tian, **M. J. Kushner - Invited**

*University of Michigan, Dept. of Electrical Engineering and Computer Science,
Ann Arbor, MI 48109-2122 USA*

**Pulsed Plasmas for Control of Reactive Fluxes in Microelectronics
Fabrication**

14:10 E. Despiau-Pujo^a, M. Brihoum^b, G. Cunge^a, M. Darnon^a, N. Braithwaite^c, O.
Joubert^a

^a*Univ. Grenoble Alpes , CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France*

^b*Toulouse-Tech-Transfer, MRV, F-31432 Toulouse Cedex 4, France*

^c*The Open University, Walton Hall, MK7 6AA, UK*

Pulsed ICP plasmas processing: 0D Model vs. Experiments

14:30 K. Eriguchi, Y. Takao, K. Ono

Kyoto University, Kyoto daigaku-Katsura, Nishikyo-ku, Kyoto 615-8540, Japan

Plasma-Induced Damage in 3D Structures behind Device Scaling

14:50 P. Brichon, E. Despiau-Pujo, O. Mourey, C. Petit-Etienne, G. Cunge, M.

Darnon, O. Joubert

Univ. Grenoble Alpes , CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France

**MD simulations of chlorine plasmas interaction with ultrathin silicon films
for advanced etch processes**

15:10 A.O. Davydova^a, E. Despiau-Pujo^a, G. Cunge^a, L. Magaud^b, L.Delfour^b, D.B.
Graves^c

^a*Univ. Grenoble Alpes , CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France*

^b*CNRS/UJF, Institut Néel, Grenoble, France*

^c*University of California, Berkeley, CA 94720, USA*

**Molecular Dynamics simulations of hydrogen plasma – graphene
interaction**

15:30 Coffee break

Session 3: Masking materials

Chair: M. Darnon, CNRS-LTM

15:50 M. Mebarki^{a,b,c}, M. Darnon^b, C. Jenny^a, D. Ristoiu^a, N. Posseme^c, O. Joubert^b

^aSTMicroelectronics/LTM, 850 street Jean Monnet, 38926 Crolles, France

^bUniv. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France

^cCEA-Leti, Minatec, 17 rue des Martyrs, F-38054 Grenoble, Cedex 9, France

Role of the mask on contact etching at the 20 nm node

16:10 P. Bézard^a, G. Cunge^a, E. Latu-Romain^a, O. Joubert^a, R. Tiron^b, X. Chevalier^c

^aUniv. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France

^bCEA LETI, 17 avenue de martyrs, Grenoble, 38054, France

^cARKEMA France, Route Nationale 117, BP34-64170 Lacq, France

Plasma etching of sub-14nm holes in silicon using PS-b-PMMA block-copolymer

16:30 P. Pimenta Barros^a, S. Barnola^a, A. Gharbi^a, M. Argoud^a, I. Servin^a, R. Tiron^a,

X. Chevalier^b, C. Navarro^b, C. Nicolet^b, C. Lapeyre^a, C. Monget^c, E. Martinez^a

^aCEA-LETI, 17 Rue des Martyrs, 38054 Grenoble, France

^bARKEMA FRANCE, Route Nationale 117, BP34-64170 Lacq, France

^cSTMicroelectronics, 850 Rue Jean Monnet, 38920 Crolles, France

Etch challenges for DSA implementation in CMOS via patterning

16:50 A. Vital^{a,b}, T. Tillocher^a, R. Dussart^a, M. Vayer^b, C. Sinturel^b

^aGroupe de recherches sur l'énergétique des milieux ionisés (GREMI), Polytech'Orleans, 14 rue d'Issoudun, B.P. 6744, F45067 Orleans Cedex 2, France

^bCentre de recherche sur la matière divisée (CRMD), 1b rue de la Férollerie, F45071 Orleans Cedex, France

Submicrometric structured silicon surfaces obtained from polymer blend film by silica replication and cryogenic plasma etching

Poster Session

17:10 – 19:00 Poster session

All authors accepted for oral presentation are also invited to present a poster

- P01 B. Adelin^{a,b}, A. Larrue^{a,b}, A. Lecestre^{a,b}, P. Dubreuil^{a,b}, Y. Rouillard^c, G. Boissier^c, A. Vicet^c, A. Monmayrant^{a,b}, O. Gauthier-Lafaye^{a,b}
^aLAAS-CNRS, 7 avenue du Colonel Roche, BP 54200, 31031 Toulouse cedex 4, France
^bUniversité de Toulouse ; UPS, INSA, INP, ISAE ; LAAS ; BP 54200, 31031 Toulouse cedex 4, France
^cInstitut d'Electronique du Sud (IES), Université Montpellier 2, Place Eugene Bataillon, 34095 Montpellier, France
High aspect ratio deep etching in GaInAsSb/AlGaAsSb system by ICP-RIE plasma
- P02 J. Dubois^a, N. Possémé^b, G. Cunge^a, E. Latu-Romain^a, L. Vallier^a, O. Joubert^a
^aUniv. Grenoble Alpes , CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France
^bCEA-LETI, 17 av. des martyrs, 38054 Grenoble Cedex, France
Plasma wall interaction in H₂ plasma processes
- P03 N. Sirse, M. Foucher, J.-P. Booth, P. Chabert
^aLaboratoire de Physique des Plasmas, Route de Saclay, Palaiseau, 91128, France
Ground-state bromine atoms measurements by Two-Photon Absorption Laser-Induced Fluorescence
- P04 M. Fouchier^a, E. Pargon^a, B. Ben Bakir^b, P. Brianceau^b
^aUniv. Grenoble Alpes , CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France
^bCEA-Leti, 17 rue des Martyrs, F-38054 Grenoble cedex 9, France
Optimization of the optical transmission of submicron silicon rib waveguides
- P05 G. Krasnikov^a, O. Gushin^a, V. Bliznetsov^b, L. Kolobova^a, Y. Gurskiy^a, A. Elpidiforov^a, Y. Gurskiy^a, C. Volk^a, P. Ignatov
^aInstitute of Molecular Electronics, Moscow, 103460, Russia
^bInstitute of Microelectronics, Singapore, 117685, Singapore
Plasma etching processes for trench isolation technology
- P06 J. Jussot^a, E. Pargon^b, B. Icard^c
^aUniversité Joseph Fourier - BP 53, 38041 Grenoble Cedex 9, France
^bUniv. Grenoble Alpes , CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France
^cCEA - LETI, MINATEC, 17 rue des martyrs, F-38054 GRENOBLE Cedex 9, France
Line width roughness mitigation techniques with e-beam lithography
- P07 S. Mouchtouris and G. Kokkoris
^aInstitute of Nanoscience and Nanotechnology, NCSR Demokritos, Aghia Paraskevi, 15344, Greece
Multiscale modeling in plasma reactors: Linking the operating parameters with surface roughness evolution
- P08 A. Lecestre^{a,c}, P. Dubreuil^{a,c}, S. Noblecourt^{a,b}, J. Tasseli^{a,c}, E. Imbernon^{a,c}, F. Morancho^{a,b},
^aCNRS, LAAS, 7 avenue du colonel Roche, BP 54200 F-31031 Toulouse Cedex4, France
^bUniv de Toulouse, UPS, LAAS, F-31031 Toulouse, France
^cUniv de Toulouse, LAAS, F-31031 Toulouse, France
Anisotropic Deep Reactive Ion Etching without Aspect Ratio Dependence Etching for silicon power devices

- P09 M. Loucif Seiad^{a,b,c,e}, A. Singh^b, V. K. MKuppuswamy^b, Y. Cao^d, M. Ferhat^e, R. Gronheid^b
^a*KACST-Intel Consortium Center of Excellence in Nano-manufacturing Applications (CENA), Riyadh, Saudi Arabi*
^b*imec, Kapeldreef 75, B-3001 Leuven, Belgium*
^c*Centre for Development of Advanced Technologies (CDTA), Baba Hassen, Algeria*
^d*AZ Electronic Materials USA Corp., 70 Meister Ave., Somerville, NJ 08876, USA*
^e*Amar Thelidji University of Laghouat, Algeria*
PMMA removal in diblock copolymer P(S-b-MMA) self-assembly process
- P10 Y. Song^a, A.P. Milenin^b
^a*KU Leuven MTM, Kasteelpark Arenberg 44, 3001 Heverlee, Belgium*
^b*IMEC, Kapeldreef 75, 3001 Heverlee, Belgium*
Challenges of Dense and Isolated Structure Patterning: Depth Loading Study in STI
- P11 S.Averkin, V.Lukichev, A.Orlikovskiy, N. Orlikovskiy, A.Rylov, I. Turin.
Institute of physics and technologies RAS..117218 Nakhimovskiy prospekt 36/1 FTIAN. Moscow Russia
Anisotropic etching of Si with high aspect ratio and 30-50nm aperture in two-stage cyclic RIE process.
- P12 O. Pollet^a, R. Sommer^a, S. Barnola^a, C. de Buttet^{a,b}, C. Richard^b, C. Jenny
^a*CEA, LETI, MINATEC Campus, 17 rue des Martyrs, 38054 Grenoble Cedex 9, France*
^b*ST Microelectronics, 850 rue Jean Monnet, 38920 Crolles, France*
Evaluation of Plasma and Wet Processes for Trilayer Stack Rework in 14nm Technology Node: Impact on Si-BARC and Efficiency
- P13 V. A. Rainysh, A.V. Shurupov, M.A. Shurupov
Joint Institute for High Temperatures of RAS (JIHT RAS), Russia
Problems of gas sorbates on surfaces of dispersed particles and their solution by using non-equilibrium Plasma
- P14 T. Zheng^a, I. Vos^a, R. Athimulam^a, E. Altamirano Sanchez^a, K. Xu^a, D. Hellin^b, E. Camerotto^b, H. Jumel^b, M. Titus^c
^a*IMEC, 3001 Leuven, Belgium*
^b*Lam Research, 3001 Leuven, Belgium*
^c*Lam Research, 4400 Cushing Parkway, Fremont, California, USA*
N10 SADP Bulk FinFET Depth Micro Loading Improvement With Bias Pulsing Plasma
- P15 T. Tillocher^a, X. Liu^a, A. Vital^{a,b}, N. Gosset^a, P. Lefaucheux^a, M. Vayer^b, C. Sinturel^b, M. Boufnichel^c, R. Dussart^a
^a*GREMI, Polytech'Orléans/CNRS, 14 rue d'Issoudun, BP 6744, Orléans, 45067, France*
^b*CRMD, 1b rue de la Férollerie, Orléans, 45071, France*
^c*STMicroelectronics, 16 rue Pierre et Marie Curie, BP 7155, Tours, 37071, France*
Multiscale holes in silicon by cryogenic etching
- P16 J.-Q. Zhou, M.-D. Hu, C.-L. Zhang, Q.-Y. He, H.-Y. Zhang
^a*Semiconductor Manufacturing International Corporation, No.18 Zhang Jiang Rd., Pudong New Area, Shanghai, 201203, P.R.China*
A Study of Advanced All-in-one Dual Damascene Etch
- P17 J. Zhao^a, M. Funk^a, L. Chen^a, T. Nozawa
^a*Austin Plasma Lab., Tokyo Electron America, Austin, Texas, 78741, USA*
^b*TEL Technology Center Sendai, Tokyo Electron Limited, 2-1 Osawa 3-chome, Sendai 981-3137, Japan*
Evolution of Plasma Generated Vacuum UV in Diffusion Plasma

19.00 End of day

Tuesday, May 13th 2014

Session 4: Sidewall roughness

Chair: E. Pargon, CNRS-LTM

08:30 **S. Suri, A. M. Myers, S. H. Sung, B. Turkot - *Invited***

Components Research, Intel Corporation, Hillsboro, Oregon

Evolving Selectivity Requirements and New Materials Challenges in Plasma Etch

09:10 **O. Ros^a, P. Gouraud^a, M. Fouchier^b, E. Pargon^b, S. Barnola^b,**

^aSTMicroelectronics, 850 rue Jean Monnet, 38926 Crolles Cedex, France

^bUniv. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex.

New plasma processes for improved dimensional control and LWR for a 28nm gate patterning

09:30 **P. De Schepper^{a,b}, E. Altamirano-Sanchez^a, A. Goodyear^c, Z. El Otell^{a,b}, J.-F. de Marneffe^a, S. De Gendt^{a,b}**

^aIMEC, Kapeldreef 75, B-3001 Leuven, Belgium

^bKatholieke Universiteit Leuven (KULeuven), Department of Chemistry, Leuven, Belgium

^cOxford Instruments Plasma Technology, Bristol, UK

Photoresist treatment using an ICP H₂ plasma and low ESC temperature: LWR study

09:50 **E. Dupuy^a, M. Fouchier^a, E. Pargon^a, J. Pradelles^b, H. Grampeix^b, P. Pimenta-Barros^b, S. Barnola^b, O. Joubert^a**

^aUniv. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex, France

^bCEA-Léti, 17 avenue des Martyrs, F-38054 cedex 09, Grenoble, France

Sidewall roughness characterization of a 20nm half-pitch resist-core spacer patterning process

10:10 Coffee break

Session 5: Plasma diagnostics

Chair: J.-P. Booth, CNRS-LPP

10:30 **D. Gahan** and M. Hopkins - *Invited*

Impedans Ltd, Unit 8 Woodford Court, Dublin 17, Ireland

Ion Energy Distribution Measurements – Past, Present and Future.

11:10 M. Foucher^a, E. Carbone^b, J.-P. Booth^a, P. Chabert^a,

^a*Laboratoire de Physique des Plasmas, Route de Saclay, Palaiseau, 91128, France*

^b*Univ. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex. France*

Inductively-coupled plasmas in Cl₂/O₂ : measurements of atom, Cl_xO_y and electron densities

11:30 G. Cunge^a, E. Despiou-Pujo^a, M. Darnon^a, N. St J. Braithwaite^b, N. Sadeghi^a, O. Joubert^a

^a*Univ. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, F-38054 Grenoble Cedex. France*

^b*Department of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK*

Producing ion waves from acoustic pressure waves in pulsed inductive plasmas

11:50 Z. el Otell^{a,b}, D. Marinov^a, V. Samara^b, M. D. Bowden^{a,c}, J. F. de Marneffe^b, P. Verdonck^b, N. St. J. Braithwaite^a

^a*Department of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK*

^b*imec, Kapeldreef 75, 3001 Leuven, Belgium*

^c*Electrical Engineering and Electronics Department, University of Liverpool, L69 3GJ, UK*

Development of a novel wafer probe for in-situ measurements

12:10 Lunch break

Session 6: Plasma-induced damage

Chair: N. Poss  m  , CEA-Leti

13:40 **A. Ranjan**, M. Wang, S. Sherpa, S. Voronin, V. Rastogi, P. Ventzek - *Invited*
Tokyo Electron Technology Center, America, LLC, 255 Fuller Rd., STE 244, Albany, NY, USA
Tokyo Electron America, Inc. 2400 Grove Blvd., Austin, TX, USA
Spatially Segregated Plasmas for High Selectivity Etching and Mitigation of Plasma Induced Damage

14:20 L. Zhang^{a,b}, J.-F. de Marneffe^a, F. Vajda^a, M. Heyne^a, V. D. Rutigliani^a,
L. Wen^a, J. Bommel^a, Z. Tokei^a, S. de Gendt^{a,b}, M. R. Baklanov^a
^a*IMEC, 3001 Leuven, Belgium*
^b*Department of Chemistry, Katholieke Universiteit Leuven, 3001 Leuven, Belgium*
Low damage integration of ultralow-k porous organosilicate glasses by Pore-Stuffing approach

14:40 T. Zheng, V. Paraschiv, H. Dekkers, L.-A. Ragnarsson, A. Dangol, S. A. Chew
IMEC, 3001 Leuven, Belgium
TiN/TaN Selective Etch In Replacement Metal Gate with Chlorine Based Plasmas

15:00 A. Paterson, J. Shoeb, S. Sriraman, T. Kamp
Lam Research Corporation, 4650 Cushing Parkway, Fremont CA 94538 USA
The role of VUV photons in sub-threshold etching of Si

15:20 F. Shang, X.-Y. Meng, F.-L. Li, Q.-H. Han, H.-Y. Zhang
Semiconductor Manufacturing International Corporation, No.18 Zhang Jiang Rd., Pudong New Area, Shanghai, 201203, P.R.China
Synchronous Pulsing Plasma Utilization at Dummy Poly Gate Removal Process

15:40 Closing remarks