Surface Preparation and Cleaning Conference (SPCC 2018)

Cambridge, Massachusetts, USA
10-11 April 2018

ISBN: 978-1-5108-6214-2

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2018) by Surface Preparation and Cleaning Conference (SPCC)
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact Surface Preparation and Cleaning Conference (SPCC)
at the address below.

Surface Preparation and Cleaning Conference (SPCC)
c/o Mark Thirsk
Linx Consulting-PO Box 384
Mendon, MA 01756-0384
USA

Phone: 617-273-8837

mthirsk@linx-consulting.com

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
Email: curran@proceedings.com
Web: www.proceedings.com

SPCC 2018 Agenda

Linx Cleaning Conferences

Session 1: Session Chair – Joel Barnett

9:20 AM **INVITED: Selective etch requirements for the next generation of semiconductor devices – Frank Holsteyns, imec 1**

9:45 AM RMG Wet Process Challenges and the Patterning Knobs towards N5 and Beyond Logic Devices – Oniki Yusuke, imec 11

10:05 AM Wet and Siconi® cleaning sequences for SiGe epitaxial regrowth – Pierre-Edouard Raynal, CEA-Leti 25

10:55 AM Pre SiGe Wet Cleans Development for sub 14 nm Technology Node – Akshey Sehgal, GLOBALFOUNDRIES 36

11:15 AM GeSn surface preparation by wet cleaning and in-situ plasma treatments prior to metallization – Pierre-Edouard Raynal, CEA-Leti 46

11:35 AM Selective isotropic etching of Group IV semiconductors to enable gate all around device architectures – Subhadeep Kal, TEL/imec 56

Session 2: Session Chairs – Akshey Sehgal, Evelyn Kennedy

1:30 PM **INVITED: Improving BEOL for sub-10nm nodes – Kevin Boyd, GLOBALFOUNDRIES 65**

1:55 PM Characterization of Post-etch Residue Clean By Chemical Bonding Transformation Mapping – Oliver Chyan, Univ. of North Texas 85

Linx Cleaning Conferences

2:15 PM BEOL pre-metallization wet clean: post-etch residue removal and metal compatibility – QuocToan Le, imec 96

2:35 PM Selective Removal of Post-Etch Residues Formed by Patterning of High-K Materials Through Precise Control of Water during Cleaning – Jerome Daviot, Technic France 108

Session 2 (Cont.): Session Chairs – Matthew Thorum, Jagdish Prasad

3:15 PM Dry removal of a surface functionalization chemistry used for pattern collapse prevention – Guy Vereecke, imec 119

3:35 PM Cleaning Surfaces from Nanoparticles with Polymer Film: Impact of the Polymer Stripping – Adeline Lallart, STM 128

Session 3: Panel Discussion **Moderator: Mike Corbett**

4:05 PM Panel Discussion

5:20 PM: Wrap Up/Additional Questions/Adjourn Organizers

5:30 PM: Day 1 End

SPCC 2018 Agenda

Linx Cleaning Conferences

Session 4: Session Chairs – Rick Chen, Chris Sparks

9:15 AM **Invited: Process challenges associated with Nano-imprint masks – Nobuyoshi Sato, Toshiba 140**

9:40 AM Etching of Silicon Nitride with High Temperature Water and Deuterium Oxide – Joshua Barclay, Univ. of North Texas 151

10:00 AM Selective wet removal of the SiN ESL prior to contact formation – Antoine Pacco, imec 159

10:20 AM Novel EHS-Friendly Ru Select Etch and SPM Alternatives for 5nm Applications – Chien-Pin Sherman Hsu, Avantor 169

10:40 AM Development of Wet-etch Chemistries for Tungsten Word-line Recess – CK Ge, Versum 178

Session 4 (Cont.): Session Chairs – Shariq Siddiqui, Thomas Phely-Bobin

11:25 AM Study of cobalt etch control by pH and oxidizer – Yuuichi Ogawa, Kurita 186

11:45 AM Developing Wet Cleans for a Cobalt Contact Integration Scheme 200 – Akshey Sehgal, GLOBALFOUNDRIES

SPCC 2018 Agenda

Linx Cleaning Conferences

12:05 PM Deposition of Volatile Chlorohydric Acid on Copper Wafer Depending on Humidity and HCl Airborne Concentration – Minh-Phuong Tran, CEA-Leti 202

12:25 PM Ammonia cross contamination: FOUP to wafer evaluation and their volatile acids comparison – Paola Gonzalez, Entegris 210

2:00 PM: **INVITED: The Business Cycle Upswing Impact on Semiconductors — Duncan Meldrum Ph.D., Chief Economist, Hilltop Economics LLC** N/A

2:25 PM Acidic Cleaning Solutions for Post InGaAs CMP Cleaning – Jin-Goo Park, Hanyang University 219

2:45 PM Fundamentals of Post-CMP Cleaning of Dielectric Surface Contaminated with Ceria (Nano-to Micro) Particles – Atanu Das, Entegris 230

3:05 PM Characterization of incoming PVA brush for 10 nm below post CMP cleaning Process – Jung-Hwan Lee, Hanyang University 240

3:25 PM Post Cleaning Chemical for Tungsten Chemical Mechanical Planarization – Jun-Yong Kim, Samsung 254

SPCC 2018 Agenda

Linx Cleaning Conferences

Posters Skyline Suites

Post Etch Residue Removal on Cobalt Contact 266
– Wilson Yeh, Dupont

Improved post etch wet clean method for defectivity reduction in 14 nm BEOL process 267
– Srishti Agrawal, GLOBALFOUNDRIES

Greener SC1 Process For Single Wafer Cleans 268
– Dhiman Bhattacharyya, GLOBALFOUNDRIES

From fundamentals to application: one universal solution toward ceria PCMP cleaning for different demands in advanced FEOL processing – Jhih-Fong Lin, Dupont 275

The Last Puzzle toward Cost-Effective CMP Processing: New-generation PCMP Cleaner for Positive-charged Silica Slurry – Jhih-Fong Lin, Dupont 276

Polysilicon Post CMP Cleaning: Material Solution beyond the Emerging Technical Hurdle in FEOL Processing – Jhih-Fong Lin, Dupont 277

Post-CMP W Cleaners with Excellent Tungsten Compatibility for Both Buffing and Brush Clean
– Zoey Chiang, Dupont 278

Characterization of High Purity Ultrasonic Final Cleaning of Metal Oxide Plasma Coated Parts
– Osama Khalil, QuantumClean 279

Single Nanoparticle ICP-MS Analysis of Process Chemicals and UPW Used in Surface Cleaning and Preparation – Lisa Mey-Ami, Air Liquide - Balazs NanoAnalysis 280

SPCC 2018 Agenda

Linx Cleaning Conferences

Filter material cleanliness characterization by electrophoretic purification/analysis
– Makonnen Payne, Pall 288

Metrologies of Amine and Ammonium in Post Etch Residue Removal Formulations
– Jingjing Wang, ECI Technology 297