A MESSAGE FROM THE ORGANIZERS

WE ARE EXCITED TO HAVE YOU JOIN US at Ultrapure Micro 2018 in Austin, TX. You might have noticed that the conference has changed its name and dropped water from its title, which means we grew and expanded the program beyond water challenges at fabs. This year we are thrilled to share the biggest technical agenda ever with a full 2 days of technical content featuring 56 presentations and 22 roundtables.

While the UPW and Water Management tracks got stronger and bigger, the conference also features a brand-new track that covers High Purity Chemicals. Ultrapure Micro 2018 now covers all major aspects of high purity fluids production and management and brings together a wider community of semiconductor professionals that are ready to collaborate.

This year’s Keynote Speakers: Dr. Mustafa Badaroglu, Qualcomm (May 31) and John Painter, GLOBALFOUNDRIES (June 1) will share how the digital revolution is changing the semiconductor world. Make sure to start your day with their exciting insights on Moore’s law challenges and new forces driving the market, scheduled for the morning of both days.

UPM 2018 also features a closing panel: Microelectronics Technology Management and Innovations: Where are the Gaps? This end-users’ panel will unveil fabs’ perspectives on bringing innovations to the market.

Following last year’s success, we have expanded the Learning Series Workshop that was held on May 30 and had two parallel tracks: UPW Production and Water Management.

Everything is bigger in Texas - including our Ultrapure Micro 2018 event. We hope that you not only enjoy the reach of its content but the big fun that will be had at dinner on May 31 as you kick off your boots for lawn games, trivia, and karaoke over a traditional Texas meal!

On behalf of the UPM 2018 Co-Moderators and Production team, we welcome you to UPM 2018 - Have a Great Time!

—The 2018 Ultrapure Micro Team
2018 CO-MODERATORS

ALAN KNAPP
Director, Microelectronics
Evoqua Water Technologies, LLC

BERNARD ZERFAS
Facilities Engineer
GLOBALFOUNDRIES

BOB MCINTOSH
Consultant
Enviro-Energy Solutions

DAN WILCOX
Senior Staff Engineer
Tesla Motors (Gigafactory)

DON HADDER
Process Engineer
Intel Corporation

STEVEN EDMUND
Technology Development Facilities Engineering
Intel Corporation

ALEX MILSHTEEN
Facility Engineering Manager
Intel Corporation

SEASON HILL
Former Facilities Engineer
Samsung Austin Semiconductor

SLAVA LIBMAN
CEO
FTD Solutions LLC

DANIEL STUCKY
Material Technology Engineer
Samsung Austin Semiconductor
### UPW Track

**UPW System – Best Known Practices**
- **Speaker:** Slava Libman, FTD Solutions
- **Time:** 9:00-9:45
- **Duration:** 45 Minutes

**Fears and Myths in UPW Distribution**
- **Speaker:** Dave Buesser, FTD Solutions
- **Time:** 9:50-10:35
- **Duration:** 45 Minutes

**Total Organic Carbon in UPW**
- **Speaker:** Rick Godec, Godec Incorporated
- **Time:** 10:50-11:25
- **Duration:** 30 Minutes

**Reverse Osmosis Troubleshooting**
- **Speaker:** Denise Haukkala, DOW Water Solutions
- **Time:** 11:25-12:35
- **Duration:** 70 Minutes

**LUNCH**
- **Time:** 12:30-1:30

### Water Management Track

**Case Study of End-of-Pipe Water Management**
- **Speaker:** Ben Winsett, Texas Instruments
- **Time:** 9:00-9:45
- **Duration:** 45 Minutes

**Treating Hydrofluoric Acid Waste Effluent**
- **Speaker:** Todd Hook, Evoqua Water Technologies
- **Time:** 9:50-10:35
- **Duration:** 45 Minutes

**Site Water Model & Strategy Workshop**
- **Speakers:** Brandon Eckberg, Farnsworth Group; John Morgan, H2Morgan; Boris Eliosov, FTD Solutions
- **Time:** 10:50-12:20
- **Duration:** 90 Minutes

**LUNCH**
- **Time:** 12:30-1:30
# UPMICRO 2018 LEARNING SERIES

**DAY 0 | MAY 30, 2018**

## UPW TRACK

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Duration</th>
<th>Speaker</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30-2:30</td>
<td>Understanding Ion Exchange Resins</td>
<td>60 minutes</td>
<td>Beryn Adams, Lanxess</td>
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</tr>
<tr>
<td>2:35-3:20</td>
<td>Back-End Filtration/POU Filters</td>
<td>45 Minutes</td>
<td>Gerd Heser, Pall GmbH</td>
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</tr>
<tr>
<td>3:20-3:35</td>
<td><strong>COFFEE BREAK</strong></td>
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</tr>
<tr>
<td>3:35-4:20</td>
<td>UPW System Configurations</td>
<td>45 Minutes</td>
<td>Glen Sundstrom, Evoqua Water Technologies; Co-Author: Jill Wallin, Evoqua Water Technologies</td>
<td></td>
</tr>
<tr>
<td>4:25-5:00</td>
<td>Measuring Small Particles in UPW Systems</td>
<td>30 Minutes</td>
<td>Keith Dillenbeck, Particle Measuring Systems</td>
<td></td>
</tr>
<tr>
<td>5:05-5:35</td>
<td>DO2, Sodium, &amp; Silica in UPW</td>
<td>30 Minutes</td>
<td>Steve deVilleneuve, SWAN Analytical USA; Co-Author: Todd Sharrett, SWAN Analytical USA</td>
<td></td>
</tr>
</tbody>
</table>

## WATER MANAGEMENT TRACK

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>1:30-2:30</td>
<td>Membrane Bioreactors – Technology Overview Applications &amp; Trends in Microelectronics</td>
<td>60 minutes</td>
<td>Carsten Owerdieck, SUEZ Water Technologies</td>
<td></td>
</tr>
<tr>
<td>2:35-3:20</td>
<td>Cooling Towers Optimization</td>
<td>45 Minutes</td>
<td>Philip Yu, Nalco Water</td>
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<tr>
<td>3:20-3:35</td>
<td><strong>COFFEE BREAK</strong></td>
<td></td>
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<tr>
<td>3:35-4:20</td>
<td>Brine Management For Microelectronics Facilities: History, Drivers, Trends &amp; Technology</td>
<td>45 Minutes</td>
<td>Chuck Dale, SUEZ Water Technologies; Co-Authors: Bill McClain, SUEZ Water Technologies, Wing Cho, SUEZ Water Technologies</td>
<td></td>
</tr>
<tr>
<td>5:45 - 6:45</td>
<td>Welcome Drinks open to all our delegates</td>
<td></td>
<td></td>
<td>Location: Zilker Terrace</td>
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</tbody>
</table>

**SPONSORED BY**

Heraeus
8:00-8:15 | DAY 1 | INTRODUCTION AND AWARDS
The Ultrapure Micro team and Co-Moderators will discuss what to expect from the conference, as well as give the awards for the best presentations from the 2017 conference.

8:15-8:45 | KEYNOTE PRESENTATION
MUSTAFA BADAROGLU, QUALCOMM
Moore’s law has been slowing down due to electrical, patterning, and yield limits. Fortunately, emerging forces such as new device architecture, optimization and applications are driving the industry. How will cloud computing and connectivity change the growing market and how will it impact water and chemicals management?

8:50-9:30 | YIELD IRDS & SEMI STANDARDS
Reinforced Process of Enabling Advanced Existing and Future Semiconductor Technologies
Slava Libman will present updated standards and procedures from the IRDS working group focused on UPW.

9:30-10:00 | COFFEE BREAK sponsored by Entegris
### ULTRAPURE WATER

**SESSION 1:** Advanced Analytical Methods for UPW

| 10:00 | Use of Extraction Modeling to Predict Contamination Levels in Ultrapure Water Systems  
Speaker: Gary Van Schooneveld, CT Associates;  
Co-Authors: Balazs NanoAnalysis, Enviro-Energy Solutions, FTD Solutions | Relationship Between Contaminants and Defects in the World of High Purity Chemicals  
Speaker: Don Hadder, Intel Corporation | MEC or Membrane Enhanced Crystallizer: a new Process for Semiconductor HF Wastewater Treatment  
Speaker: Sylvain Keav, Ovivo Switzerland;  
Co-Author: Ovivo Deutschland GmbH |
| --- | --- | --- | --- |
| 10:30 | Method for Preparing Ultra-low PPT Level DO in UPW Using Membrane Degassifiers to Enable Superior Wafer Surface Preparation  
Speaker: Amit Sengupta, 3M; Co-Author: RP Innovative Engineering Solutions, LLC | Ultra High Purity Chemical Challenges  
Speaker: Daniel Stucky, Samsung Austin Semiconductor | Copper Ion Exchange at SAS: Concept to Large-Scale Design  
Speaker: Mike Knapp, Samsung Austin Semiconductor;  
Co-Author: Evoqua Water Technologies |
| 11:00 | Online Urea Monitoring for Ultrapure Water Production in Semiconductor Fabrication Plants  
Speaker: Kazushige Takahashi, Organo Corporation | The Analysis and Stability of High Purity TetraMethylAmmonium Hydroxide (TMAH) with the Agilent 8900 QQQ-ICPMS  
Speaker: Mark Kelinske, Agilent Technologies | A Novel Approach for the Treatment of Wastewater Generated During Semiconductor Wafer Fabrication  
Speaker: Kevin Huang, PeroxyChem |
| 11:30 | Online Measurement of Total Active Ions Activity of Chemicals at Sub-ppb Levels Using Advanced Resistivity Algorithms  
Speaker: Steven Wells, GF Signet; Co-Author: CT Associates | Online 24/7 Single-ppt Metals Monitoring for Semiconductor Process Chemicals Using a Central ICP-MS Detector Connected to 20 Remote Automated Samplers  
Speaker: Daniel Wiederin, Elemental Scientific | Performance of Membrane Distillation for TMAH Wastewater Treatment in Nano-electronics Industries – Case Study: IMEC, Belgium  
Speaker: Imtisal-E Noor, KTH Royal Institute of Technology, Sweden; Co-Author: XZero AB, Imec, Belgium Scarab Development |

### HIGH PURITY CHEMICALS

**SESSION 1:** High Purity Chemicals in Semiconductor Manufacturing

| 10:00 | Use of Extraction Modeling to Predict Contamination Levels in Ultrapure Water Systems  
Speaker: Gary Van Schooneveld, CT Associates;  
Co-Authors: Balazs NanoAnalysis, Enviro-Energy Solutions, FTD Solutions | Relationship Between Contaminants and Defects in the World of High Purity Chemicals  
Speaker: Don Hadder, Intel Corporation | MEC or Membrane Enhanced Crystallizer: a new Process for Semiconductor HF Wastewater Treatment  
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Speaker: Daniel Wiederin, Elemental Scientific | Performance of Membrane Distillation for TMAH Wastewater Treatment in Nano-electronics Industries – Case Study: IMEC, Belgium  
Speaker: Imtisal-E Noor, KTH Royal Institute of Technology, Sweden; Co-Author: XZero AB, Imec, Belgium Scarab Development |

### WATER MANAGEMENT

**SESSION 1:** Water Management for Advanced Semiconductor Industry

| 10:00 | Use of Extraction Modeling to Predict Contamination Levels in Ultrapure Water Systems  
Speaker: Gary Van Schooneveld, CT Associates;  
Co-Authors: Balazs NanoAnalysis, Enviro-Energy Solutions, FTD Solutions | Relationship Between Contaminants and Defects in the World of High Purity Chemicals  
Speaker: Don Hadder, Intel Corporation | MEC or Membrane Enhanced Crystallizer: a new Process for Semiconductor HF Wastewater Treatment  
Speaker: Sylvain Keav, Ovivo Switzerland;  
Co-Author: Ovivo Deutschland GmbH |
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Speaker: Daniel Stucky, Samsung Austin Semiconductor | Copper Ion Exchange at SAS: Concept to Large-Scale Design  
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## CONFERENCE AGENDA | ULTRAPURE MICRO 2018

### DAY 1 | SESSION 1, cont’d & SESSION 2

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 1, cont’d: Advanced Analytical Methods for UPW</th>
<th>SESSION 1, cont’d: High Purity Chemicals in Semiconductor Manufacturing</th>
<th>SESSION 1, cont’d: Water Management for Advanced Semiconductor Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00</td>
<td>Detection of Non-Volatile Trace-Impurities in Ultrapure Water With Universal Surface Enhanced Raman Spectroscopy Speaker: Ali Özhan Altun, ETH Zurich</td>
<td>Stop Using Detection Limits for ICP-MS Speakers: Anthony Schleisman, SACHEM; Dan Montville, SACHEM</td>
<td>Way to Operate RO system Without Fouling Speaker: Boris Lieberman, IDE Technologies Ltd.</td>
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<td>1:00</td>
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<tr>
<td>1:30</td>
<td>The Use of Focused Aerosol Deposition (FAD) to Capture, Identify and Quantify Killer Defect Particles in UPW Speaker: Gary Van Schooneveld, CT Associates; Co-Authors: Aerosol Devices, Inc., Kanomax FMT</td>
<td>Evaluation of Trace Total Organic Carbon in High Purity Sulfuric Acid Speaker: Brett Clark, SUEZ Water Technologies &amp; Solutions</td>
<td>Cooling Water Diagnostics and Oxidizing Biocides Combination to Control Biofouling Speaker: Stephen N’Guessan, Samsung Austin Semiconductor; Co-Author: Nalco Water</td>
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<tr>
<td>2:00</td>
<td>Evaluation of the Particle Behavior in Ultrapure Water System Distributions Using 10 nm or Larger Particles Measuring Method Speaker: Kyohei Tsutano, Organo Corporation; Co-Author: Enviro-Energy Solutions</td>
<td>Understanding Nanoparticle Contamination in Chemical Distribution Systems – Data Analysis Strategies Speaker: Dan Rodier, Particle Measuring Systems</td>
<td>Benefits of Side-Stream Filtration for Condenser Water Systems in Microelectronics Speakers: Cindy Ortega, NXP Semiconductors; Emily Taylor, Nalco Water</td>
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</tbody>
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### 2:30 - 2:50 COFFEE BREAK SPONSORED BY

**Evoqua**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker/Details</th>
</tr>
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<tbody>
<tr>
<td>2:50</td>
<td><strong>SESSION 2, cont’d:</strong> Partical Analysis and Control in UPW</td>
<td><strong>SESSION 2, cont’d:</strong> High Purity Chemicals in Semiconductor Manufacturing <strong>SESSION 2, cont’d:</strong> Efficient Cooling Water Systems' Operations and Management</td>
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<td></td>
<td><strong>A Non-Traditional ICP-MS Analysis for Nanoparticles Characterization of Ultra-Pure Water</strong> Speaker: Jinjin Wang, Air Liquide—Balazs Nanoanalysis</td>
<td><strong>Correlating Particle Counter Data Between Different Instruments</strong> Speaker: Mike Naggar, MGN International</td>
</tr>
<tr>
<td>3:20</td>
<td><strong>Nanoparticle Profiling in a UPW Polishing Section by Different Monitoring Systems: Advanced Understanding of Sources and Sinks</strong> Speaker: Maria Pia Herrling, Ovivo Switzerland; Co-Author: Micron Technology</td>
<td><strong>Purification Method for High Purity PGMEA Using Ion Exchange Resins and Analysis of High Sensitive Trace Metals by ICP-MS</strong> Speaker: Yasuhiro Yoshimura, Organo Corporation <strong>PCW Best Practices</strong> Speaker: Philip Yu, Nalco Water</td>
</tr>
<tr>
<td>3:50 - 4:00</td>
<td><strong>TRANSITION BREAK</strong></td>
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<tr>
<td>4:00 - 5:45</td>
<td><strong>ROUNDTABLES SESSION</strong> <em>(see staff for handout)</em></td>
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<tr>
<td>5:45 - 6:45</td>
<td><strong>DRINK RECESSION SPONSORED BY</strong></td>
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<tr>
<td>7:00 - 10:00</td>
<td><strong>DINNER AT THREADGILL’S SPONSORED BY</strong></td>
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</table>
8:00-8:45  |  DAY 2  |  KEYNOTE PRESENTATION
JOHN PAINTER,  GLOBALFOUNDRIES

As Moore's law continues to experience challenges, the pace of innovation continues to drive explosive growth in connected devices. These devices are estimated to triple from 8 to 24 billion by 2020. The demand for data is exploding. As the capital required to compete in the industry gets greater and the technologies more complex, the industry continues to see consolidation. As process nodes push physical boundaries, the need for continuous innovation in the production of ultrapure water and chemicals, as well as the technologies to treat unique and complex waste streams, is a never ending treadmill. Are we prepared?

8:45-9:00  |  TRANSITION BREAK
## DAY 2 | SESSION 3

### ULTRAPURE WATER

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker/Co-Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>UPUR – A Metal-Free Combination of Several UPW Polishing Steps in a Multifunctional Reactor for the Removal of TOC and H₂O₂ Traces</td>
<td>Philippe Rychen, Ovivo Switzerland AG; Co-Authors: Ovivo Deutschland, Applied University Furtwangen</td>
</tr>
<tr>
<td>9:30</td>
<td>Optimization of UPW System with Improved Ion Exchange Resin</td>
<td>Hiroshi Kimoto, Nomura Micro Science Co., Ltd.</td>
</tr>
<tr>
<td>10:00</td>
<td>Highly Cross-Linked Membranes Improve Silica, Boron, Nitrate, and Urea Rejection</td>
<td>Jerry Aguilar, Lanxess</td>
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</table>

### HIGH PURITY CHEMICALS

<table>
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<tr>
<td>9:00</td>
<td>A New Approach for Metal Ion Purification to Meet the Needs for Trace Metal Reduction for 10nm Node and Beyond</td>
<td>Majid Entezarian, 3M</td>
</tr>
<tr>
<td>9:30</td>
<td>Purification of Chemicals for Semiconductor Use by Ultra-Clean Ion Exchange Resins</td>
<td>Akira Nakamura, Organo Corporation</td>
</tr>
<tr>
<td>10:00</td>
<td>Evaluating the Risk of Metal Contamination from Wet Cleaning of Silicon Wafers by HF-last Process</td>
<td>Drew Sinha, SUMCO USA</td>
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</table>

### WATER MANAGEMENT

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<tr>
<td>9:00</td>
<td>Proven Success of Innovative Water Management Solutions for Advanced Semiconductor Manufacturing</td>
<td>Alex Milshiteen, Intel Corporation</td>
</tr>
<tr>
<td>9:30</td>
<td>Get the Most Out of Your Water Treatment Systems – Reduce Costs and Stretch Capacity Through Projects, Incentives, Operating Methods, and System Hacks</td>
<td>Brad Herbert, ON Semiconductor; Co-Author: H₂Morgan</td>
</tr>
<tr>
<td>10:00</td>
<td>Keeping Increasingly Complex Water Management Simple</td>
<td>Alex Evashen, FTD Solutions</td>
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</tbody>
</table>

**10:30 - 11:00 COFFEE BREAK**
<table>
<thead>
<tr>
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<th>WATER MANAGEMENT</th>
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</thead>
<tbody>
<tr>
<td><strong>SESSION 3, cont’d: Solving Current UPW Challenges with Innovative Design Solutions</strong></td>
<td><strong>SESSION 3, cont’d: High Purity Chemicals in Semiconductor Manufacturing</strong></td>
<td><strong>SESSION 3, cont’d: Strategic Site Water Management at the Fab</strong></td>
</tr>
</tbody>
</table>
| **Removal of Silica in Primary Pure Water System**  
Speaker: Takaaki Chuuman, Kurita Water Industries Ltd.; Co-Author: Kyushu University | **Empirical Model to Understand the Particle Removal Behavior during Bulk Chemical Filtration**  
Speaker: Anthony Ozzello, Entegris | **Semiconductor End of Pipe Wastewater Reclaim System – Piloting Data**  
Speaker: Ben Winsett, Texas Instruments; Co-Authors: Ovivo Switzerland, Ovivo USA |
| **11:00** | **11:30** | **12:00** |
| **Filter Media Removal Characteristics in the Low nm Range**  
Speaker: Jochen Ruth, Pall GmbH; Co-Author: RBFM Consulting | **Molecular Dynamics Analysis of a Water-Methanol Liquid Mixture Behavior on a Silicon Wafer Surface**  
Speaker: Masayuki Kawakami, Organo Corporation; Co-Author: Osaka University | **Closed Circuit Reverse Osmosis, the New Standard for Industrial Desalination**  
Speaker: Matthew Jones, Desalitech | **Construction of a Brine Line to the Sea as a Solution for Salt Removal From Wastewater**  
Speaker: Alon Tish, Rimon Ltd | **Case Study: Leveraging Value Engineering to Achieve Major Cost Savings in UPW System Capacity Upgrade**  
Speakers: John Heye, Texas Instruments; David Buesser, FTD Solutions | **Brine Management Options: Technology, Innovation, & Economics for Zero Liquid Discharge**  
Speaker: Joshua Zoshi, Saltworks Technologies |
<p>| <strong>COMBINED SESSION: Technology and Project Management in Semiconductor Water and Chemicals</strong> | | <strong>12:30 - 1:30 LUNCH</strong> |</p>
<table>
<thead>
<tr>
<th>TIME</th>
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</thead>
</table>
| 1:30 | Operational Challenges in Back-End UPW Systems  
Speaker: Chelsea Tura, Intel Corporation | Thermoplastic Pipe Stress Modeling: Best Known Methods for a Safe and Reliable Long-Life Piping System  
Speaker: Hanspeter Mueller, Georg Fischer Piping Systems | A Day in the Life of an Analytical Engineer  
Speaker: Glen Slayter, Intel Corporation |
| 2:00 | Performance and Sizing of UV Reactors for TOC Destruction in Ultrapure Water  
Speaker: Ferdinando Crapulli, Trojan Technologies | Hot UPW Shutdown and Return to Production: An Operational Guide to Minimizing System Impact and Planning for the Unknown  
Speakers: Charlotte Parks, Samsung Austin Semiconductor; Alana Denning | Trace Metal Analyzer Method: Case Study SAS  
Speaker: Vladimir Dozortsev, Aqua Metrology Systems Limited; Co-Author: Samsung Austin Semiconductor |
| 2:30 | sTPC Enabled New UPW Ultra Filter Product Quality for Microelectronic Manufacturing  
Speakers: James Lee, Samsung Austin Semiconductor; Gary Shrestha, Samsung Austin Semiconductor | Impact of Sleeves Quartz Quality to the Total Costs of Ownership of UPW Reactor (UV@185nm)  
Speaker: Klaus Zoltner, Heraeus Quarzglas GmbH & Co KG | Development of Self-Cleaning pH Electrode Coated with Titanium Oxide (TiO2) and Its Photocatalytic Activity  
Speaker: Yuji Nishio, HORIBA Advanced Techno; Co-Author: MIE University |
| 3:00 | Strange Case of the High Dollar RO Maintenance Bill: Unsolved Rapid Membrane Degradation and Undissolved Metal Fouling  
Speaker: Vivian Benjes, Intel Corporation | Strategies for Electrical Energy Reduction Required for Producing High Purity Water and then Qualifying for Capital Rebate Programs to Offset and Improve ROI of Energy Reducing Capital Projects  
Speaker: John Morgan, H2Morgan; Co-Author: Energy 350 |  |
CONFERENCE AGENDA | ULTRAPURE MICRO 2018
DAY 2 | CLOSING PANEL

3:30-3:45 | TRANSITION BREAK

3:45-4:45 | CLOSING PANEL
MICROELECTRONICS TECHNOLOGY MANAGEMENT AND INNOVATIONS: WHERE ARE THE GAPS?
Chair—Slava Libman, FTD Solutions

PANELISTS
John Painter, GLOBALFOUNDRIES
Dan Wilcox, Tesla Motors
Steven Edmund, Intel Corporation
Daniel Stucky, Samsung Austin Semiconductor
Bob McIntosh, Enviro-Energy Solutions

The microelectronics industry’s needs are defined, but why are innovations not happening at the desired pace? The IRDS Roadmap and Semi Standards are great examples of industry collaboration aimed at closing these gaps, but is there a better collaboration process between tech users and solution providers? This panel will discuss how to bring innovations to the market and unveil fabs’ perspectives on collaboration and such crucial processes as R&D, infrastructure expansion, supply chain management, risk mitigation and management of water systems and high purity chemicals.
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3M MEMBRANES BUSINESS UNIT is a leading expert in manufacturing and developing membranes and modules for ultrafiltration and dissolved gas control applications. 3M™ Liqui-Cel™ Membrane Contactors are compact devices that rapidly strip dissolved gases from liquids without chemicals. These high performance devices are installed in-line to improve water quality and fluid process efficiency. 3M™ Liqui-Flux™ ultrafiltration modules take advantage of a pressure-driven out flow design and operate in dead-end or cross-flow mode. With over 90 m² of membrane surface area and various port configuration options these modules couple flexibility with the durability of 3M membrane for reliable and sustained performance.

AGILENT TECHNOLOGIES leads the industry with robust, reliable instruments that provide the ability to analyze, confirm and quantify substances of interest. Our workflow solutions enable you to maintain stringent practices from sample preparation, through analysis, to final report. When combined with our informatics architecture, large quantities of data can be managed while preserving the integrity and security of the results. Agilent offers a complete line of GC, LC, MS and Spectroscopy instruments and technologies, as well as the related consumables, support and services. For more information visit our website – www.agilent.com.

AQUAFINE is the leading provider of innovative industrial fluid treatments using ultraviolet (UV) technology. We develop high-performance, eco-friendly products for today’s most demanding UV applications. Whether your application be disinfection, TOC reduction, residual ozone or chlorine destruction, we are proud to assist you with achieving successful results for your challenging water needs. With trusted industrial UV solutions, Aquafine is purifying the world’s biggest brands. We are improving people’s lives on a daily basis by leading the way to safer, more efficient UV treatment solutions. Learn more at aquafineuv.com.

ASAHI/AMERICA offers a wide selection of thermoplastic piping systems and components for projects ranging from ultrapure water applications to water treatment and chemical feed lines. Headquartered in Lawrence, MA, Asahi/America domestically manufactures custom piping components and maintains a large inventory capable of supplying multi-million dollar projects. Among Asahi/America’s offerings is the Purad® PVDF high purity piping system, which is manufactured to the most stringent quality and purity standards. Asahi/America’s offering includes the Poly-Flo® and Chem Proline® systems are ideal solutions for water treatment applications. We also maintain an extensive fleet of welding equipment to support large projects across the country.

BANNER INDUSTRIES is a privately held company and leader in flow component distribution for high purity and industrial manufacturing. Our complete synergistic product line and expert technical team enable us to serve a number of diverse industries including semiconductor, life sciences, pharmaceutical, solar and associated markets. From
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large projects to individual products, Banner Industries is your one-stop shop for premier components, technical consultation, and world-class customer service. Our product line includes assemblies, cleanroom products, filters, fittings, heaters, gauges, mass flow controllers, mass flow meters, O-rings and seals, purifiers, pumps, regulators, tubing and pipe, valves, and more.

**DIAMOND FIBERGLASS** designs and manufactures custom engineered Fiberglass Reinforced Plastic (FRP) tanks, vessels and pipe. With over three decades in the fiberglass fabrication business, we are straight-shooters, owner managed and hold our industry’s highest vessel certification: ASME RTP-1. We stand behind our products. Our affiliate, Diamond Services, can provide turn-key solutions including OEM certified installations, preventive maintenance, inspections, retrofits, relines and other non-metallic field services support for your plant. Diamond is a composite industry leader in the storage and conveyance of industrial water and wastewater. Call us today to help get your next FRP project off the ground and see it through to a successful completion.

**ELEMENTAL SCIENTIFIC** offers real-time ultra-trace metal monitoring and ultraclean automated sample introduction systems for direct analysis of high purity chemicals by ICPMS. Real-time monitoring of semiconductor process chemicals and ultrapure water (UPW) is vital to provide the information needed to improve manufacturing processes and maximize product yield. Metal impurities are monitored in process chemicals at delivery (by tanker or drums), at the central chemical supply, at distribution points, and at the point of use. Chemical monitoring is required 24/7 to verify low or even sub-ppt levels of metal contamination. Attend HPC Session 1, Thursday at 11:30am to learn more about Online 24/7 Single-PPT Metals Monitoring or visit www.ICPMS.com.

**ENTEGRIS** has been a provider of critical products and materials used in advanced high-technology manufacturing. These products and materials are often used to make the building blocks of many of the world’s most complex microelectronic products, such as computers, mobile devices and phones, data storage components, televisions and monitors, and automobiles.

**EVOQUA WATER TECHNOLOGIES** offers the experience, innovation and deep knowledge that your production processes require to meet the stringent demands of the microelectronics, university nanotech and solar industries. Evoqua’s cutting edge water, wastewater and reuse solutions will help you meet your requirements for regulatory compliance, lifecycle cost and UltraPure Water quality. Water management solutions from Evoqua prove their worth daily in:

- Semiconductors Fabs
- Disc Drive Manufacturing
- University Nanotechnology
- Solar Research and Development
- Solar Cell Manufacturing
- Semiconductor Equipment Manufacturing
- Evoqua – Transforming Water.

Enriching Life.
GEMÜ VALVES is a leading world-wide manufacturer of high quality valves, measurement and control systems. GEMÜ’s products are well known for their modular design, high performance, and superior quality. We strive to consistently provide a level of service exceeding the expectations of our customers. Every inquiry and order is carefully considered so the customer can be offered the most suitable GEMÜ product to match their requirements. GEMÜ’s overriding philosophy is to ensure each and every customer contact is a quality experience. GEMÜ is committed to the pursuit of quality and excellence in the development, production and manufacturing of our products.

GREENE TWEED is a leading global manufacturer of high-performance seals and engineered components. With 150+ years of technical expertise and commercial knowledge in a variety of markets, Greene Tweed collaborates with customers to develop innovative solutions that meet challenging performance requirements and reduce total cost of ownership. We offer world-wide design and manufacturing expertise, solving your critical challenges through the development of custom-designed, leading-edge components. Greene Tweed products are sold and distributed worldwide.

H2O ENGINEERING, INC is a professional and experienced OEM and service provider in the water treatment industry. We design, integrate, and manufacture membrane (RO, UF, NF) systems, filtration, ion exchange, DI, chemical injection and ozone systems. We provide system audits, engineering support, operation and maintenance, service, installation and commissioning services. We support industrial water treatment projects for the automotive, power, food and beverage, mining, water reuse, agriculture, oil & gas, as well as pharmaceutical markets. From conceptual design to technical O&M support, H2O’s extensive experience offers value to our customers.

HARRINGTON INDUSTRIAL PLASTICS is the country’s largest distributor of industrial plastic piping serving all industries with corrosive and high-purity applications. Harrington carries a complete line of piping products and accessories, and particularly noted for its technically trained sales staff. There are now over 50 strategically located branches throughout the continental U.S., and Hawaii. These facilities house all the components for a complete system such as piping, tubing, hose, tanks, grating, filtration, pumps, and instrumentation. A Harrington representative is available to you 24 hours a day, 7 days a week. To reach your local branch call (800) 213-4528.

HERAEUS QUARTZ is a market and technology leader in the production of high-purity quartz materials. We specialize in the development and manufacturing of both high purity quartz and synthetic fused silica for the microlithography, optics, semiconductor and lamp industries. We work closely with our customers to produce mainly synthetic fused materials needed for general production as well.
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as custom materials. Typical products used in the disinfection market would include both undoped and doped tubing for lamps and sleeves along with plate and rod materials.

HORIBA’s range of products for chemical process control and wet process monitoring are used throughout the semiconductor manufacturing process and other high performance applications to improve process stability and reduce waste. Products include; chemical concentration monitors for measuring the concentration of various chemicals, in-line pH monitors which are used throughout various industries including pharmaceutical and food and beverage manufacturing and ultra-pure water monitors when ultra-pure water is integral to the manufacturing process.

JE DUNN CONSTRUCTION has been a leader in the construction industry since its founding in 1924 by John Ernest Dunn. We are a family and employee-owned corporation with 20 offices and more than 3000 employees. We are one of the largest commercial contractors in the United States, specializing in construction management, program management, and design/build projects of every size. JE Dunn works with manufacturing, energy and services clients to extend functionality, support sustainability directives, and accommodate new technologies for all advanced industries. As your indispensable partner, we will deliver the facility that helps you meet your project goals.

Developed to seal nonmetallic piping in 1992 for the Pulp and Paper industry the KC MULTI-RING products were developed and the first patent was granted in 1994. Since that first patent there have been over 40 others filed around this unique system. Since 1993 the KCMR products have been used in the semi-conductor industry as the standard for the UPW systems. There have been over one million seals installed with zero reported failures. With modifications to our production the new UHP now exceeds the F57 requirement for years to come. KCMR continues to be focused on the best sealing system.

LEVITRONIX is the worldwide leader in magnetically levitated Bearingless Motor technology, specializing in supplying ultrapure fluid handling devices (pumps, flow sensors, mixers...) for Microelectronics, Life Science and Industrial applications. The magnetic levitation technology incorporated in the high purity pump system enables contact free operation achieving ultra-low particle generation, extremely low metal extraction and pulsation free delivery of the fluid at the smallest foot print. Levitronix offers the ideal solution for those applications that demand contaminant-free pumping, pressure boosting, mixing or fluid control in a highly reliable fashion.

Diverse corporations in 170 countries look to NALCO WATER, an Ecolab company, to deliver customized solutions and expert, onsite...
service. Harnessing innovative water, hygiene and process technologies and services, we partner with our customers to minimize their water consumption, maximize their results and optimize their total cost of operation.

**OVIVO** is a global leader in sustainable water treatment solutions for industrial, municipal water and wastewater treatment, spanning all industries worldwide. The company’s passion to create value in water is executed through the design, installation and commissioning of highly sophisticated water treatment systems, providing the best solutions to treat and recycle water at the lowest energy cost. While the world acknowledges that it is facing a clean water crisis, the demand for water is ever increasing. OVIVO develops and provides high-performance technologies to serve the semiconductor industry’s use of water and has had great success in meeting the most stringent TOC requirements (< 0.3 ppb).

**PALL MICROELECTRONICS** is the global leader in filtration, separation and purification technologies for the microelectronics and photovoltaic industries. It supports the semiconductor, data storage, fiber optic, advance display, inkjet and materials markets with a comprehensive suite of contamination control solutions for chemical, gas, water, chemical mechanical polishing (CMP) and photolithography processes. The company headquarter is in Port Washington, New York, with extensive operations throughout the world.

**PARTICLE MEASURING SYSTEMS INC. (PMS)**, a subsidiary of Spectris plc, is a global technology leader in contamination monitoring, the inventor of laser particle counting, and now is the leading provider of solutions for monitoring and controlling many forms of contamination that impact companies that manufacture in ultra-clean environments.

**CULLIGAN ULTRAPURE** is a full service water treatment solution and equipment provider. Our unique technical knowledge, practical field experience and strategic alliances with the major OEMs in the water industry make us the provider of choice for the high-purity and UPW markets such as power, pharma and semiconductor industry where quality requirements exceed 18 megohm-cm resistivity and TOC in the low ppb levels. We design and install water treatment systems including high-purity loops, deionization, reverse osmosis, pretreatment, ultraviolet/ozone radiation and environmental remediation. We also provide complete systems maintenance services and replacement parts and assemblies. We are ISO 9001: 2015 Certified and are soon to carry 17025 Certification. We operate state-of-the-art DI resin regeneration plants at our Dallas and Austin facilities, managed and operated by WQA/TCEQ certified personnel.