# CMSE 2019
# PROGRAM BOOK

## 23rd Annual
## Components for Military & Space Electronics
## Conference & Exhibition

### April 16-18th, 2019

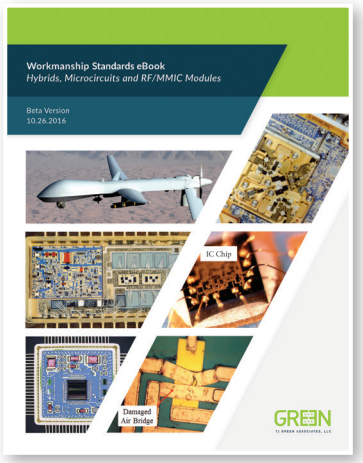
Four Points by Sheraton (LAX)
Los Angeles, California

CMSE

*Organized by: TJ Green Associates LLC*

Workmanship Standards eBook:

# Hybrids, Microcircuits and RF/MMIC Modules




This is an online illustrated guide depicting photos of common workmanship defects as seen during production and each defect slide is tied to a particular page in MIL-STD-883. Its intended as an on-the-floor working document for operators, inspectors and quality engineers to facilitate an understanding of defects generated during the manufacture of hybrids, microcircuits and RF/MMIC modules and how they relate to the contractual requirements of MIL-STD-883.

## Access over 300 color defect pics

linked to Mil-Std-883 source requirements with just a click!

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## CMSE 2019…Message from the Chair

On behalf of the Program Committee I would like to personally welcome everyone to this year's 23nd annual CMSE Conference and Exhibition. One of the unique aspects of CMSE is our focus on both active and passive components. You will find experts in both fields coming together under one roof to converse and share solutions to common challenges of designing and building reliable hardware for both military and commercial space programs. This year we have a heavy emphasis on passive component technology…so take advantage and learn all you can.

I'd like to personally thank our sponsors and exhibitors for supporting CMSE. On a programming note an electronic copy of all the presentations and final registration details will be sent via a secure link to all attendees in a week or so.

Welcome!

Thomas Green,
CMSE Program Chairman

# PROGRAM COMMITTEE

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*Program Chair*

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*Components Technology Institute Inc.*

Tom Terlizzi
*TJ Green Associates LLC*

Mike Cozzolino
*Raytheon*

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*AVX Corp.*

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# 2019 KEYNOTE SPEAKERS

Called a "National Treasure" by the former undersecretary of defense- **DENNIS ZOGBI** is the founder and lead researcher at Paumanok Publications and the author of more than 300 studies on the global market for passive electronic components and related raw materials. Mr Zogbi advises many of the largest hedge funds in the world in the area of mass produced and specialty electronic components and speaks on Wall Street on a monthly basis. He is dialed in to primary and secondary resources worldwide and has deep contacts and sticky customer relationships with companies, agencies and institutions in the USA, Japan, Germany, Korea, France, greater China, UK, central Africa and Canada. With his work with Leon Hamiter and CARTS MR Zogbi has presented market intelligence reports to the passive components industry in multiple locations worldwide. Mr Zogbi has also been Keynote speaker at EDS, ECIA Stats, CARMs and multiple other industry events. Mr Zogbi has written Marketeye for TTI/Berkshire Hathaway since 1999. Today Mr Zogbi will be discussing the shortage of MLCC and how it fits into the 30 year big data set that Paumanok has provided the global markets since 1988.

**DR. JONATHAN AHLBIN** is the Missile Defense Agency, Division Chief for Parts, Materials, and Processes Engineering (Acting) and the Branch Lead for EEE Parts Engineering. In these roles, he is responsible for implementing and managing the team that oversees all MDA BMDS parts, materials, and process requirements and policies that include Counterfeit Parts, Part Selection and procurement, Screening & Qualification Criteria, Failure Analysis, Radiation Hardness Assurance, and Materials Engineering. Dr. Ahlbin has a BE, MS, and PhD in lectrical Engineering all from Vanderbilt University. He has published over 50 papers in the areas of microelectronic reliability, radiation survivability, and supply chain risk management. Previously, Dr. Ahlbin worked for USC-ISI as a Senior Electrical Engineer supporting research and development programs for DARPA, IARPA, and DTRA.

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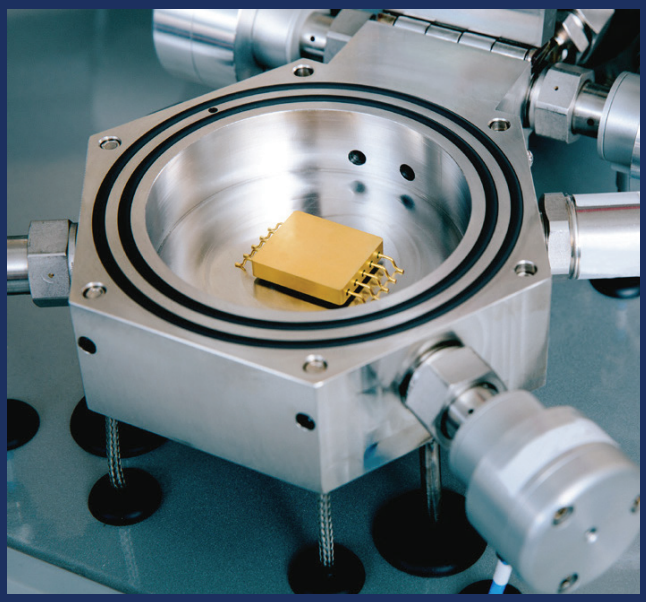
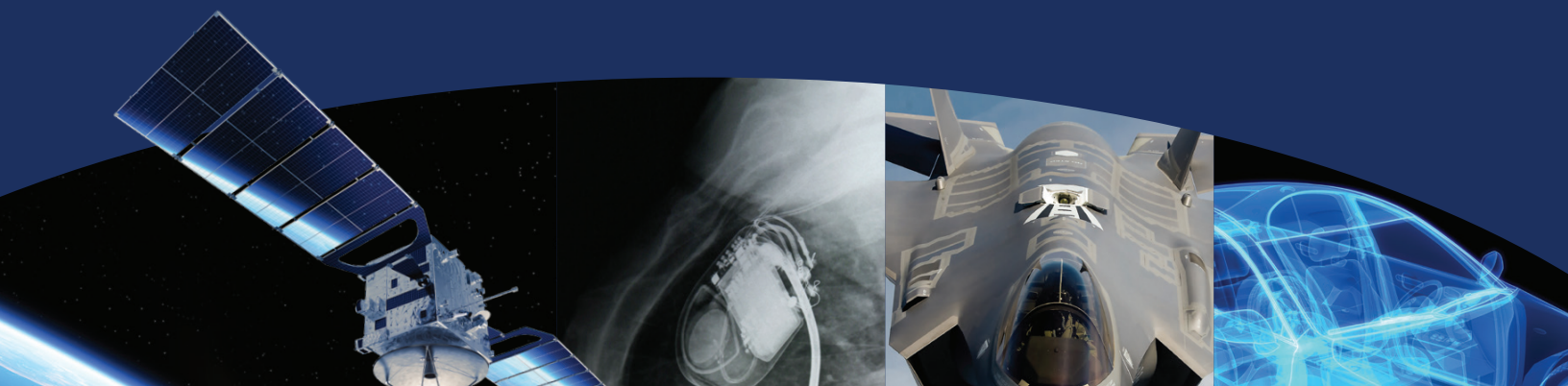


**Contact Krista Vivenzo 1 (855) ORS LABS ext. 2231**



# 2019 TUTORIAL SCHEDULE

## TUESDAY, APRIL 16

| 1/2 DAY SESSIONS | | |
|---|---|---|
| 0800 - 1200 | **Moisture in Microelectronics... Volatiles Control in Hermetic Electronic Components** | **Thomas Green**<br>*TJ Green Associates LLC*<br>**Robert Lowry**<br>*Electronic Materials Consultant* |
| 1200 - 1300 | SIT DOWN LUNCH (COFFEE BREAK AT 1000 AND 1500) | |
| 1300 - 1700 | **Advanced Integrated Circuit Packaging and Reliability Issues** | **Richard Rao, Ph.D.**<br>*Microchip Technology, Inc.* |

| FULL DAY SESSION | | |
|---|---|---|
| 0800 - 1200 | **Passive Component Reliability Workshop Part 1** | **Dr. Yuri Freeman**<br>*KEMET*<br>**John Marshall**<br>*AVX Corporation*<br>**Chris Reynolds**<br>*AVX Corporation*<br>**Scott Harris**<br>*Vanguard Electronics*<br>**Bryan Yarborough**<br>*Vishay Dale Electronics* |
| 1200 - 1300 | SIT DOWN LUNCH (COFFEE BREAK AT 1000 AND 1500) | |
| 1300 - 1700 | **Passive Component Reliability Workshop Part 2** | **Dr. Yuri Freeman**<br>*KEMET*<br>**John Marshall**<br>*AVX Corporation*<br>**Chris Reynolds**<br>*AVX Corporation*<br>**Scott Harris**<br>*Vanguard Electronics*<br>**Bryan Yarborough**<br>*Vishay Dale Electronics* |

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# 2019 PRESENTATION SCHEDULE

**WEDNESDAY, APRIL 17**
**EXHIBITOR HOURS: 1100 - 1930**

| | | |
|---|---|---|
| 0800 - 0810 | **Welcome/ Intro** | **Tom Green**<br>*TJ Green Associates LLC* |
| 0810 - 0840 | **Keynote**<br>**MLCC Shortages: FY 2019 Tier-To-Tier Replacement Strategies and Alternative Reference Design Solutions** | **Dennis Zogbi**<br>*Paumanok Publications, Inc.* |
| **Session # 1: Passive Components for Military and High Rel Space Systems**<br>**Session Chair: Ron Demcko** | | |
| 0840 - 0905 | **Stable and Reliable Supply of Tantalum, Now and Going Forward** | **David Knudson**<br>*Tantalum-Niobium International Study Center (T.I.C.)* |
| 0905 - 0930 | **Automotive vs. Hi-Rel and De-rating in Solid Tantalum Capacitors** | **Yuri Freeman**<br>*KEMET Electronics* |
| 0930 - 0955 | **Wet Tantalum Capacitor Development – Past, Present, Future** | **Mike Mosier**<br>*Vishay Intertechnology* |
| 0955 - 1010 | **COFFEE BREAK** | |
| 1010 - 1035 | **Base Metal Ceramic Capacitor Developments on X7R products for Space and High Reliabiity Applications** | **John Marshall**<br>*AVX Corporation* |
| 1035 - 1100 | **Effect of Environments on Parametric Degradation in Polymer Tantalum Capacitors** | **A. Teverovsky**<br>*NASA Goddard* |
| 1100 - 1125 | **MLCC and Tantalum Electrolytic Capacitor Interchangeability in High Capacitance Applications** | **Chris Reynolds**<br>*AVX Corporation* |
| 1125 - 1150 | **Integrated Power Management with Ferromagnetic Thin-Film Power Inductors** | **Noah Sturcken**<br>*Ferric* |
| 1150 - 1345 | **LUNCH - IN EXHIBITS AREA** | |
| 1345 - 1445 | **Panel Discussion: Mil/Aerospace Talent Gap… How to Attract and Retain Young Engineers**<br><br>**Moderaror: Tom Green** | **Rick Rodriguez**<br>*Raytheon Missile Systems*<br>**Roz Morrison**<br>*Raytheon Missile Systems*<br>**Dr. Michael Hamilton**<br>*Alabama Micro/Nano Science & Technology Center* |
| 1445 - 1510 | **Termination Cracking in MIL-PRF-55342 Chip Resistors** | **Mike Cozzolino**<br>*Raytheon Company* |
| 1510 - 1535 | **A Screening Method Using Pulsed-Power Combined with Infrared Imaging to Detect Pattern Defects in Bulk Metal Foil or Thin Film Resistors** | **Jay Brusse**<br>*NASA Goddard* |

| | | |
|---|---|---|
| 1535 - 1550 | **COFFEE BREAK** | |
| 1550 - 1615 | **Embedded Thin Film Nickel-Phosphorus Resistor** | **Bruce Mahler**<br>*Ohmega Technologies, Inc.* |
| 1615 - 1640 | **A Case Study of Grain Slippage in Wirebound RTDs** | **Mike Cozzolino**<br>*Raytheon Company* |
| **Session # 2: RF and Power GaN Technology<br>Session Chair: Jeff Sokol** | | |
| 1640 - 1700 | **Space Qualification of GaN HEMTs -Guidance Document Announcement** | **John Scarpulla**<br>*The Aerospace Corporation* |
| 1700 - 1720 | **Liquid Crystal Polymer High Speed-RF High Layer Count Circuits with Embedded Die Options** | **James Rathburn**<br>*HSIO Technologies, LLC* |
| 1720 - 1740 | **Power Enhancement Mode GaN HEMT update** | **Jim Larrauri**<br>*Freebird Semiconductor* |
| 1740 - 1800 | **Eutectic Die Attach for High Power GaN Devices** | **Casey Krawiec**<br>*StratEdge Corporation* |
| 1800 - 2000 | **WELCOME RECEPTION** | |

# 2019 PRESENTATION SCHEDULE

**THURSDAY, APRIL 18**
**EXHIBITOR HOURS: 1000 - 1400**

| | | |
|---|---|---|
| 0800 - 0830 | **Keynote**<br>**Flexibility and Innovation in Military Systems** | **Jonathan Ahlbin**<br>*Missle Defense Agency* |
| **Session # 3: Advanced Packaging for Military and Aerospace<br>Session Chair: Bob Lowry** | | |
| 0830 - 0855 | **Honeywell: The Path to Affordable Electronics for Commercial Space Constellations** | **Anthony Casasnovas**<br>*Honeywell* |
| 0855 - 0920 | **System in Package Technologies for Space Applications** | **Doug Sheldon**<br>*NASA Jet Propulsion Laboratory* |
| 0920 - 0945 | **Thin Is In – The Challenge and Solution of Picking Thinner Die** | **Sarah Parrish**<br>*Royce Instruments* |
| 0945 - 1010 | **MIL-PRF-19500 Appendix J: Inclusion of Plastic Encapsulated Discrete Semiconductor (PEDs) Devices for Military Applications** | **Benny Damron**<br>*NASA/Jacobs Space Exploration Group (JSEG)* |
| 1010 - 1025 | **COFFEE BREAK** | |
| 1025 - 1050 | **ATROX - Die Attach Using Hybrid Silver Sintering Technology** | **Michael Previti**<br>*MacDermid Alpha* |
| 1050 - 1115 | **An Overview on Chip to Package Interaction Reliability Issues** | **Richard Rao**<br>*Microchip* |
| 1115 - 1140 | **CCA Conformal Coatings, Best Practice- Application & Optical Microscopy Inspection Methods** | **Aaron C. DerMarderosian Jr.**<br>*Raytheon Space & Airborne Systems* |
| 1140 - 1205 | **Visual Identification of Organic Residue on Microelectronic Components via In-Process Visible Light Fluorescence** | **Tristan Baldwin**<br>*BAE Systems* |
| 1205 - 1335 | **LUNCH - IN EXHIBITS AREA** | |
| **Session # 4: Componenet Technology Reliability Issues<br>Session Chair: Leon Hamiter** | | |
| 1335 - 1400 | **Copper Bond Wire Reliability & Decap Challenges** | **Aaron Lecomte**<br>*Raytheon Integrated Defense Systems* |
| 1400 - 1425 | **Decapsulation for Failure Analysis without Damage to Cu and Ag Wires** | **Bruce Wilson**<br>*BSET EQ* |
| 1425 - 1450 | **RGA & Lid-Seal: Waivers, Woes & Wants** | **Andy Moor**<br>*Northrop Grumman Mission Systems* |
| 1450 - 1505 | **Lid Voiding Hermeticity** | **Rich Richardson**<br>*MicroCircuit Laboratories* |

| | | |
|---|---|---|
| 1505 - 1530 | **SCHURTER Fuses for Space** | **Bruno Zemp**<br>*Schurter Electronic Components* |
| 1530 - 1555 | COFFEE BREAK | |
| 1555 - 1620 | **Predictive Maintenance** | **Ed Dodd**<br>*DfR Solutions* |
| 1620 - 1645 | **Flexible Superconducting Interconnect Technology for Future Cryogenic Electronics Systems** | **Dr. Michael C. Hamilton**<br>*Auburn University* |
| 1645 - 1710 | **Biodegradable Electronics Packaging** | **Bob Lowry**<br>*Electronic Materials Consultant* |
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**Location:** Tucson, Arizona and Huntsville, AL

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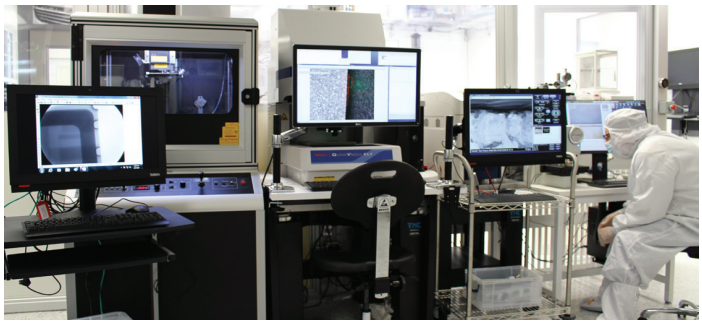
*MicroCircuit Laboratories delivers customized hermetic cover seal processes with no (0) gross leakers obtaining fine leak rates of E-10 atm-cm3/sec air, significantly slower than MIL-STD-883 Test Method 1014 Seal for space level hermetic packages. Seam Seals with Au/Ni plated kovar™ materials are provided with lowest leak rates and highest seal joint integrity. 80Au20Sn solder cover seals easily exceed Test Method 2012 x-ray lid seal void rejection criteria. All MCL cover seal design and processes are easily transferred, with tooling and a complete warranty.*

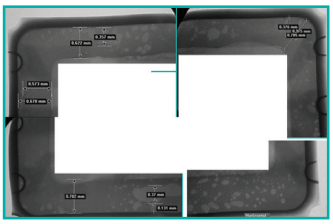


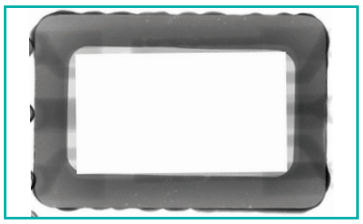
Whether development, prototyping or pilot production, rapid turn times are provided with MCL's integration, from tooling fabrication all the way through cover seal testing.

Capabilities include design and modeling software, class 1 cleanroom with 100% simco air ionizers, ESD flooring, etc.; pre-seal vacuum bake moisture removal; low temperature hermetic sealers with parallel seam sealing or one shot welding; inert environmental processing with class 1 particle performance and 0.1 PPM $O_2$ and $H_2O$ inert environment; PC programmable helium bombing, single system automatic dry gross and fine leak testing; particle impact noise detection and more.

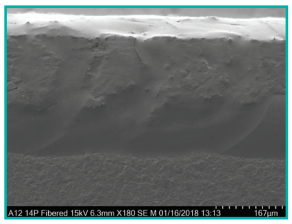
Contact MCL to discuss your cover seal processing requirements and learn how we can help lower your cost of hermetic packaging.

Problem 80Au20Sn and MCL 80Au20Sn Cover Seal





MCL Au/Ni Kovar™ Cover Seals with 0 Gross Leakers & E-10cm3/sec Air Leak Rates



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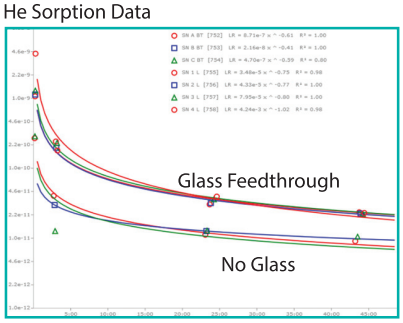
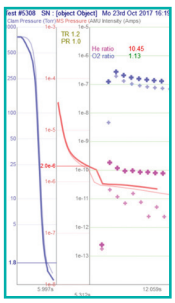
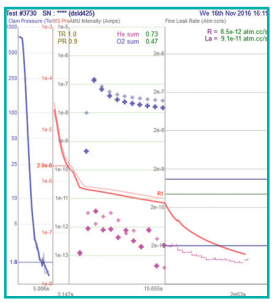



Gross Leaker



Fine Leak Performance



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