NCCAVS – TFUG Meeting
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Topic: *Advances in Display Technology*

Meeting Date: October 11, 2018

Time: 12:30 - 3:00 p.m.

Location: SEMI Global Headquarters
673 South Milpitas Blvd.
Milpitas, CA 95035

FREE TO ATTEND, JUST SHOW UP!

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CO-CHAIRS
Jacques Matteau, *Protech Materials,* jacques.matteau@protechmaterials.com
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Michael Oye, *UC Santa Cruz* and *SJSU,* moye@ucsc.edu

MEETING FOCUS
This meeting focuses on technologies and applications related to Advanced Display Technologies. The purpose of this meeting is to bring together leading researchers in academia, government, and industry with innovative technologies to nurture a free exchange of triumphs and challenges in the advances in Advanced Display Technology applications.

SPEAKERS/AGENDA

12:30 pm: FREE LUNCH (provided by Kurt J. Lesker Company) & COFFEE (Provided by UC Components)

1:00 pm Introduction and Welcome

1:05 pm *High yield equipment enables profitable OLED manufacturing*, Dr. Xuena Zhang, Applied Materials

1:40 pm *Reliability Assessment of Rotary Sputter Targets in PV Manufacturing,* Dr. Venkata Bheemreddy, MiaSole Hi-Tech Corp.

2:15 pm *Large Area Magnetron Sputtering, Ready and Waiting for Gen 10 and Beyond*, Peter Sieck

2:50 pm Closing remarks

3:00 pm Meeting adjourn

Abstracts and Bios
High yield equipment enables profitable OLED manufacturing, *Dr. Xuena Zhang, Applied Materials*
The display industry is characterized by waves of technology inflections. These include LCD scaling (which continues today), OLED in mobile, and, looking to the future, OLED TVs, foldable displays, natural 3D and more. So a key inflection today and over next few years is OLED which creates process and device challenges that equipment makers and panel makers must cooperate to overcome. OLED technology also drives process complexity and higher equipment Capex, even as overall
display costs come down with the elimination of components such as backlights and polarizers. OLED equipment enabling high yield front plane panels and better device performance is essential for fast adoption and profitable growth of OLED.

Bio: Dr. Xuena Zhang holds PhD in Physics from Max Planck Institute in Germany and was a postdoctoral scholar at Stanford University, EMBA trained at Stanford. She worked at multiple famous semiconductor companies in R&D and production groups. She has lead display MOx and LTPS Device R&D, inspection products application and marketing at Applied Materials, successfully implemented semiconductor yield methodology to display. She is currently global product marketing leading strategic OLED products.

Reliability Assessment of Rotary Sputter Targets in PV Manufacturing, *Dr. Venkata Bheemreddy, MiaSole Hi-Tech Corp.*
Developing a high-efficiency and cost-effective copper indium gallium selenide (CIGS) flexible photovoltaic (PV) cell has been enabled by a physical vapor deposition (PVD) process utilizing roll-to-roll sputtering. It is a challenging manufacturing process which relies on several key details to make it cost-effective. Success hinges upon the manufacturing of CIG alloy rotary sputter targets in a cost-effective manner. Cold spray has been demonstrated to be a suitable technique for manufacturing of large rotary targets of custom CIG alloys with deposit weights around 50 lb. A key consideration, in ensuring cost effectiveness and reliability of these rotary targets under thermo-mechanical loading during PVD process, is to ensure the integrity of the target material and the interface between the target material and cylindrical substrate throughout the PVD process. In this work an integrated approach to reliability assessment of such targets is undertaken, involving characterization of the material in asdeposited condition, characterization of the interface adhesion on cylindrical substrate in as-deposited condition, and developing means to assess target integrity under thermalmechanical loads during the PVD sputtering process. Mechanical characterization of cold spray deposited CIG alloy is accomplished through the use of indentation testing and adaptation of Brazilian disc test. A custom lever test was developed to characterize adhesion along the cylindrical interface between the CIG deposit and cylindrical substrate, overcoming limitations of current standards. A cohesive zone model for crack initiation and propagation at the deposit interface is developed and validated using the lever test and later used to simulate potential catastrophic target failure in the PVD process. More than 800 CIG sputter targets have been manufactured to date using cold spray with no production failures to date by adapting the framework presented here. Co-Authors: Kedar Hardikar, Johannes Vlcek, Venkata Bheemreddy, Daniel Juliano

Bio: Dr. Venkata Bheemreddy is a Research Scientist/Modeling Engineer at MiaSolé Hi-Tech Corp. in Santa Clara, CA. He received his Ph.D. in Mechanical Engineering from Missouri University of Science and Technology (formerly University of Missouri-Rolla) in 2014. At MiaSolé, Dr. Bheemreddy works inthe Reliability group, focusing on product reliability assessment and also provides computational modeling, material characterization support to multi-disciplinary groups. His work has been published in various peer-reviewed journals. He is also a professional member of SAMPE and ASME organizations.

Large Area Magnetron Sputtering, Ready and Waiting for Gen 10 and Beyond, *Peter Sieck*
This talk provides a review of large area sputtering technology available for Gen 10 plus size substrates. Hardware systems that makes large magnetrons effective for layers made from a wide range of materials are discussed. We'll take a look at how challenges and opportunities are being addressed in the current state of the art as well as having a look at some of the applications most likely to benefit from the super sized sputtering that evolved out of the architectural glass coating industry. Keywords: Sputtering, Coating, Manufacturing, Thin Films

Bio: Peter Sieck is an independent consultant to the flat glass sputter coating industry. He received his Bachelors of Science (Cum Laude) in Physics and Applied Mathematics from Sonoma State University in California in 1982. He has worked extensively in Applied R&D developing equipment and processes for architectural & automotive glass coatings, large area mirrors and display applications. Peter has also spent time in manufacturing engineering positions improving process stability and efficiency using design of experiments and other statistical production strategies.

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All presentations will be requested to be posted on the TFUG Proceedings webpage approximately 1-2 weeks following the meeting.

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