NCCAVS Joint User Group Meeting Agenda (CMPUG, PAG, & TFUG)

Topic: Evolving Trends in Advanced Packaging (3D integration, memory modules, AI, chiplets, on-shoring, etc.)

Meeting Date: August 21, 2024
Time: 1:00pm – 4:00pm Pacific Time (TIME ZONE CONVERTER)
Platform: Zoom

FREE TO ATTEND! ADVANCE REGISTRATION REQUIRED
(Zoom login details provided upon registering)

REGISTER FREE!

Co-Chairs:
Rob Rhoades, X-trinsic, zestrion@gmail.com
Jeff Shields, Independent Consultant, jeffrey.shields@att.net
Paul Werbaneth, Independent Consultant, pfwerbaneth@gmail.com

The Northern California Chapter of the American Vacuum Society invites you to participate in a Joint User Group Meeting on Wednesday, August 21, 2024. The meeting is being hosted by NCCAVS via ZOOM and is jointly hosted by the CMP Users Group, the Plasma Applications Group, and the Thin Film Users Group.

AGENDA (All times are Pacific Daylight Time)

1:00 p.m. Welcome and Acknowledgement of Meeting Sponsors
Co-Chairs: Rob Rhoades, Jeff Shields, Paul Werbaneth

1:10 p.m. Knut Gottfried, ErzM and Fraunhofer ENAS, *"Improved CMP processes through architecture & design optimizations"*

1:40 p.m. Daniel Pascual, ONTOS, *"Atmospheric Plasma Simplifies Die-to-Wafer Bonding"*

2:10 p.m. Jeff Gelb, Sigray Inc, *"Advanced X-Ray Imaging Technologies for Heterogeneous 3D IC Package Metrology and Inspection"*

2:40 p.m. Mike Slessor, FormFactor, *"Strategies for Probe to enable Advanced Packaging"*

3:10 p.m. Swetha Barkam, Applied Materials, *"Chemical Mechanical Planarization (CMP) for Hybrid Bonding"*

3:40 p.m. Thank you and adjournment

All presentations will be posted on the CMPUG, PAG and TFUG Proceedings webpages following the meeting.

Abstract & Bios

Daniel Pascual, ONTOS, *"Atmospheric Plasma Simplifies Die-to-Wafer Bonding"*
Abstract: This paper presents a simplified approach using atmospheric plasma for die-to-wafer bonding without the reliance on a carrier wafer or vacuum plasmas. The process is developed for hybrid bonding, 3DIC, and integrated photonics applications.
Bio: Daniel Pascual is CTO at ONTOS Equipment Systems. Daniel received his BS Degree in Chemistry from SUNY Potsdam in 1996 and then MS Degree in Mechanical Engineering from Boston University in 2001. Daniel has previously worked on bonding processes for advanced semiconductor packaging at SUSS MicroTec and CNSE/Sematech.

Jeff Gelb, Sigray Inc*, "Advanced X-Ray Imaging Technologies for Heterogeneous 3D IC Package Metrology and Inspection"*
Abstract: The advent of 3D Heterogeneous Integration (3DHI) in advanced packaging and wafer-level IC packaging introduces significant challenges for inline defect inspection and offline failure analysis. The 3D stacking and wafer bonding processes create optically opaque structures, necessitating techniques like x-rays to penetrate multiple buried layers for defect detection. However, as device features in 3DHI continue to shrink (e.g., microbumps shrinking to <10 µm in diameter and TSV interconnects scaling to single-digit micrometers), existing non-destructive techniques face substantial technological barriers. Current 3D X-ray methods require higher resolutions to meet these evolving demands, and acquiring sub-micron imaging data using conventional x-ray tomography can take hours or be impractical for large 300 mm wafers. To bridge these metrology gaps, we have developed two innovative 3D x-ray inspection tools:

1. High Throughput (3D Data in Minutes): This tool is designed for the rapid inspection of 300 mm wafers during wafer-level packaging and bonding. It can automatically resolve various 3D defects down to 0.5 µm resolution within minutes. It is also capable of addressing high-resolution multi-chiplet inspections, large advanced packages or board-level failure analysis, such as for PCBs.

2. High Resolution (300 nm spatial Resolution): This complementary tool aims to surpass the resolution limits of current leading high-resolution 3D x-ray and x-ray microscopes (XRM) for the failure analysis of advanced heterogeneous packages. It delivers true 300 nm spatial resolution (<50 nm voxel) for characterizing submicron defects in microbumps, delamination, voids, interfacial cracks, and RDL that are beyond the capabilities of existing XRMs.

Bio: Jeff is the Director of X-ray Microscopy at Sigray. He holds a bachelor's degree in Physics from UC Santa Barbara and a master's in Materials Engineering from San Jose State University, and has spent the past 20 years working with instrumentation for X-ray diffraction, tomography, and 3D image processing. He started his career at Xradia in 2006 and remained at ZEISS through the acquisition of Xradia in 2013, working on nano-tomography and correlative microscopy techniques. Mr. Gelb joined Sigray in 2017 and is focused on developing next-generation x-ray microscopy solutions.

Mike Slessor, FormFactor, *"Strategies for Probe to enable Advanced Packaging"*
Abstract: Probe is taking a prominent role in enabling advanced-packaging schemes like the 3-D integration of chiplets. This prominence is being driven by the need for high pre-assembly chiplet yields to ensure economically viable composite product yields, which is driving increased pre-production characterization, and more comprehensive test coverage and capability at probe. In addition, chiplet-to-chiplet interconnect structures are at least an order of magnitude denser than traditional flip-chip interconnect, which can create additional technical complexity and cost at probe if not managed carefully.
Bio: Mike Slessor has served as the President and Chief Executive Officer of FormFactor since 2014, and as a Director since 2013. Mike served as President from 2013 to 2014, and as Senior Vice President and General Manager, MicroProbe Product Group from 2012 to 2013. Before joining FormFactor, he was President and Chief Executive Officer of MicroProbe from 2008 through the 2012 closing of FormFactor's acquisition of MicroProbe. Prior to joining MicroProbe, he held various management, product-marketing, and applications-engineering positions in the semiconductor industry, primarily with KLA.
Mike received his Ph.D. in Aeronautics and Physics from the California Institute of Technology and his B.A.Sc. in Engineering Physics from the University of British Columbia.

Abstract & Bios (*cont.*)

Swetha Barkam, Applied Materials, *"Chemical Mechanical Planarization (CMP) for Hybrid Bonding"*
Abstract: This talk offers an in-depth examination of Chemical Mechanical Polishing (CMP) in the context of Hybrid Bonding for semiconductor manufacturing. CMP, a technique that integrates chemical and mechanical forces to achieve film planarization, plays a crucial role in hybrid bonding by ensuring precise control over dishing and surface roughness. The discussion will cover key challenges associated with CMP in hybrid bonding, including issues such as scratches, dishing, and loading, and will present strategies for addressing these challenges. The talk will conclude by highlighting the critical need for co-optimization of CMP processes in hybrid bonding and its broader implications for semiconductor manufacturing and advanced packaging.
Bio: Dr. Swetha Barkam is a Product Manager at Applied Materials' CMP Business Unit. She received her undergrad in Materials Science and Engineering from Indian Institute of Technology Kanpur (IITK), PhD from University of Central Florida (UCF) and has published 14 papers and filed multiple patents. Currently, she focuses on developing products for Chemical Mechanical Planarization (CMP), aimed at 3D Heterogenous Integration and wafer level packaging.