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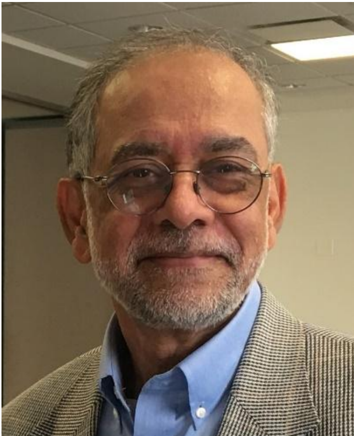
Reliability Modeling Approaches: Physics or AI/ML?

Prof. Abhijit Dasgupta
Center for Advanced Life Cycle Engineering (CALCE)
Mechanical Engineering Department
University of Maryland, College Park, MD 20742
Sponsors: IEEE Central Indiana Electronics Packaging Chapter
Date: 5/1/2026, **Time:** 11:00 AM, **Venue:** ARMS 3115 (online via zoom)

This presentation provides a high-level description of CALCE-UMD activities in reliability physics of microelectronic systems, starting with a brief history and continuing on to recent trends in multiscale modeling of the reliability of advanced microelectronic packaging The discussion includes specific focus on the importance of considering material microstructure in predictive reliability physics modeling; and explores the role of reliability physics in the context of AI/ML* approaches for reliability modeling.

In Topic 1, we will examine three examples where microstructure-sensitive modeling can provide important insights into material behavior: (i) organic interposers/substrates that are based on fabric-reinforced composites; (ii) solder alloys with heterogeneous multiscale microstructure; (iii) sintered silver materials with agglomerated nanoporous microstructure. In Topic 2, we will qualitatively explore the interplay between reliability physics and AI/ML in influencing both epistemic as well as aleatory uncertainties in reliability predictions.



*AI/ML: Artificial Intelligence / Machine Learning

Speaker Biograph: Prof. Abhijit Dasgupta, is *Jeong H. Kim Professor* of Mechanical Engineering at the University of Maryland and a principal investigator at the Center for Advanced Life Cycle Engineering (CALCE). He holds a Ph.D. in Theoretical and Applied Mechanics from the University of Illinois at Urbana-Champaign (UIUC) and has been working for over 35 years on reliability physics (RP) of conventional as well as additively-manufactured deformable and 3D electronic assemblies and interconnects. He focuses on predictive modeling methods to reduce cycle time for developing and qualifying electronic packaging. He has published widely, organized numerous conferences and workshops, taught UG and graduate courses at UMD and mentored numerous graduate MS and doctoral studies. He has served as past associate editor for the ASME Journal of Electronic Packaging, past Chair of the ASME Electronic and Photonics Packaging Division (EPPD), past member of the leadership team for the ASME Design Materials and Manufacturing (DMM) Segment and currently serves as co-lead for Reliability TWG (Technology Working Group) in the multi-society Heterogeneous Integration Roadmap (HIR) coordinated by the semiconductor industry.

Registration link: https://r4.ieee.org/cis-eps/?p=711

Contact: Prof. Ganesh Subbarayan