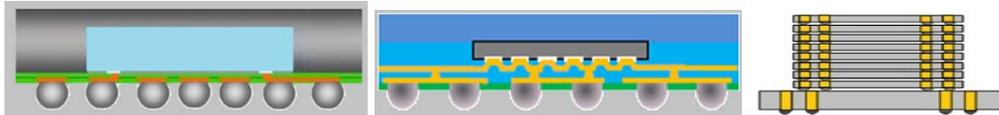


# Challenges and Solutions for Mechanical Characterization of Advanced Polymers: From adhesion strength to viscoelastic properties

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**Abstract:** Advanced polymers are involved in almost every aspect of semiconductor packaging and thus their mechanical and thermal properties have become an integral part of package design and reliability assessment. The critical properties include but not limited to: (1) chemical shrinkage and modulus evolution during curing, (2) time and temperature dependent mechanical properties, (3) glass transition temperature and coefficient of thermal expansion, (4) hygroscopic properties (moisture diffusivity and solubility), (5) thermal properties (conductivity and diffusivity), (6) adhesion strength and interfacial fracture toughness, and (7) aging and degradation rates due to environmental conditions. The testing methods to characterize the properties have been developed for many decades and some of them are routinely practiced using commercially available instruments such as the thermo-mechanical Analyzer (TMA), the dynamic mechanical analyzer (DMA), the digital scanning calorimeter (DSC), the universal testing machine (UTM), etc. As the new concepts of packaging technologies such as wafer level packaging, wafer stacking, embedded packaging, 3-D packaging, etc., are developed, advanced polymeric are introduced almost every day, but less time is allowed to characterize them for predictive modeling due to the shrinking product development cycle time.

**Presenter:** Dr. Han is Keystone Professor of Engineering, and has been actively involved in quantitative characterization of packaging materials and components for a couple of decades. Dr. Han has co-authored a textbook entitled "High Sensitivity Moiré: Experimental Analysis for Mechanics and Materials", Springer-Verlag (1997) and edited two books. He has published 12 book chapters and over 250 journal and conference papers in the field of microelectronics, photonics and experimental mechanics. He was elected a Fellow of the SEM and the ASME in 2006 and 2007, respectively. Most recently, he was named the 2016 American Society of Mechanical Engineering (ASME) Mechanics Award winner in Electronic and Photonic Packaging Division for his contributions to structural mechanics of electronic systems. If are interested in further information on this topic, please email Dr. Han at ([bthan@umd.edu](mailto:bthan@umd.edu))

