

5. Nano Materials and Polymer Composites for Electronic Packaging

Course Leaders: *C. P. Wong – Georgia Institute of Technology; Daniel Lu –Henkel Corporation*

Course Objective:

Nano materials and polymer composites are widely used in electronic and photonic packaging as adhesives, encapsulants, thermal interface materials, insulators, dielectrics, molding compounds and conducting elements for interconnects. These materials also play a critical role in the recent advances of low-cost, high performance encapsulants for flip chip, chip scale packaging (CSP), system in a package (SIP) and 3D packaging, conductive adhesives (both ICA and ACA), embedded passives (high K polymer composites), nano particles and nano-functional materials such as CNTs (some with graphenes). It is imperative that both material suppliers, formulators and their users have a thorough understanding of polymeric materials and the recent advances on nano materials and their importance in the advances of the electronic packaging and interconnect technologies.

Course Outline:

1. Introduction to nanotechnology
2. Nano solder
3. Carbon Nanotube
4. Nano materials for wafer level packaging
5. Super hydrophobic surface
6. Surface Functionalization
7. Functionalized Graphene for Energy Storage and Electrocatalysis
8. Electrically conductive adhesives
9. Conductive nano composites
10. Conductive nano-ink
11. Transparent nanocomposite

Who Should Attend:

Students, researchers, engineers, scientists and managers who are involved in research and development, designing, processing and manufacturing of microelectronic and optoelectronic components and packages, and suppliers and developers of materials for semiconductor and electronic packaging.

Bio:

Prof. C. P. Wong Professor C. P. Wong is the Charles Smithgall Institute Endowed Chair and Regents' Professor at Georgia Tech. Professor Wong has published widely with over 1,000 technical papers and holds over 65 US patents and is considered an industry legend that has made significant contributions to the industry by pioneering new materials, which fundamentally changed the semiconductor packaging technology. He is a member of the US National Academy of Engineering and a Foreign Academician of the Chinese Academy of Engineering. After his doctoral study, he was awarded a two-year postdoctoral fellowship with Nobel Laureate Professor Henry Taube at Stanford University. Prior to joining Georgia Tech, he was with AT&T Bell Laboratories and became a Fellow in 1992. He received numerous awards including the IEEE CPMT Society Outstanding Sustained Technical Contributions Award in 1995, the IEEE Third Millennium Medal in 2000, the IEEE CPMT Society Exceptional Technical Contributions Award in 2002, the Sigma Xi's Monie Ferst Award in 2007, the 2009 IEEE -CPMT David

Feldman Outstanding Contribution Award and the 2009 Penn State University Distinguished Alumni Award.

Bio:

Dr. Daniel Lu is the Vice President of Technology, Henkel Corporation in Asia Pacific. Prior to joining Henkel, he worked for the R&D department of Intel Corp (AZ, USA), as a Sr. Scientist for 7 years. He received his MS and PhD degrees on Polymer Science and Engineering from Georgia Institute of Technology in 1996 and 2000, respectively. Dr. Lu received many awards including 2017 IEEE CPMT Electronic Manufacturing Technology Award, the IEEE/CPMT Outstanding Young Engineer Award in 2004, Intel's most patent filing in 2003-2007, etc. Dr. Lu has published more than 50 journal papers, wrote chapters for six books, and holds over 100 US and international patents. He is the editor of the books "Materials for Advanced Packaging (2008 edition and 2017 edition)" and co-author of the book "Electronically Conductive Adhesives with Nanotechnologies (2009)". Dr. Lu is a senior member of IEEE, and an associate editor of IEEE Transactions on Advanced Packaging and Journal of Nanomaterials, and an editorial board member of Nanoscience & Nanotechnology-Asia.