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High performance EMC for automotive applications

As the number of electronic components in automobiles increases, the electronic industry has seen an increasing need for organic packaging materials that meet property requirements for long cycling operations under harsh environments. Of the many materials involved in a package, epoxy-based molding compound (EMC) is the outermost encapsulation, and it is essential for the molding material to offer high temperature durability. Research has shown that the adverse effects of thermal aging on EMC can be attributed to temperature-induced shrinkage and oxidation. EMCs currently on the market use multi-aromatic structure in the resin to add thermal stability to the cured composite, but still show undesirable changes in material properties at temperatures above ~175°C, where resin decompositions and loss of volatile species are observed. For improved thermal stability, it is desirable for EMCs to have high glass transition temperature. We enhance the resin crosslinking and thermal resistance by utilizing the superior heat resistance of the epoxy-triazine copolymer in the curing system. In this case, the highly aromatic epoxy matrix increases the EMC's Tg, and the s-triazine moiety further enhances high temperature stability the EMC. In this talk, we will show preliminary results on the incorporation of s-triazine into EMC and the thermal stability improvements that results.

Biography

C P Wong is the Charles Smithgall Institute Endowed Chair and Regents' Professor at Georgia Institute of Technology, and Dean of Engineering at the Chinese University of Hong Kong. He received his primary and secondary education in Hong Kong and furthered his education in the US. He received his BS degree from Purdue University, and PhD degree from the Pennsylvania State University. He received many awards, among those, the AT&T Bell Labs Fellow Award in 1992, the IEEE CPMT Society Outstanding Sustained Technical Contributions Award in 1995, the Georgia Tech Sigma Xi Faculty Best Research Paper Award in 1999, Best MS, PhD and Undergraduate Thesis Awards in 2002 and 2004, respectively, the University Press (London) Award of Excellence, the IEEE Third Millennium Medal in 2000. His research interests lie in the fields of polymeric materials, electronic packaging and interconnect, interfacial adhesions, nano-functional material syntheses, Si etching and energy storage. His work includes nano-composites such as well-aligned carbon nanotubes, graphenes, lead-free alloys, flip chip underfill, ultra high k capacitor composites superhydrophobic coatings and supercapacitors. He holds over 65 US patents, numerous international patents, has published over 1000 technical papers, 12 books. He is a Member of the National Academy of Engineering of the USA since 2000, and a Foreign Academician of the Chinese Academy of Engineering 2013.

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