Sym. G : Electro-packaging

POLYMERIC MATERIALS- I

E-THU-19

THE HIGH THERMAL CONDUCTIVE EMC FOR MICROELECTRONIC ENCAPSULATION, Wonho Kim, Jong-Woo Bae, Suk-heon Cho, Yong-Woo Hong(Dept. of Chem. Eng, Pusan National Univ., Pusan 609-735, korea) and Il-Dong Choi(Dept. of Mat. Eng, Korea Maritime Univ., Pusan, Korea)

Due to the trends of faster and denser circuit design, dielectric properties of packaging materials for semi-conductor will give a greater influence on performance and reliability. Also as chip become more densely packaging, thermal dissipation becomes a critical reliability issue. Consequently, four important properties for a semi-conductor packaging material are low values of dielectric constant, high values of thermal conductivity, relatively low values of thermal expansion coefficient and low cost. Thus, in this study, to achieve enhanced performance of EMC, AlN(Aluminum Nitride) was selected as the filler for epoxy matrix. As a result, thermal conductivity of EMC filled with 70 vol% of AlN increased as 7~8th times compared to that of EMC filled with crystalline silica(70 Vol%). Also, combination of different particle sizes of AlN filler induced better flowability of EMC.

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Sym. G : Electro-packaging

POLYMERIC MATERIALS- II

E-THU-20

FULLY RODLIKE POLY(4,4'-BIPHENYLENE PYROMELLITIMIDE)S CONTAINING VARIOUS SHORT SIDE GROUPS AS DIELECTRIC MATERIALS: SYNTHESIS, STRUCTURE, AND PROPERTIES, S.M. PYO, S.I. KIM, T.J. SHIN, and M. REE,* (Dept. of Chemistry, Polymer Research Institute, Pohang Univ. of Sci. & Technol., Pohang 790-784 Korea)

A series of benzidine diamines with short side groups, such as methyl, methoxy, fluoro and trifluoromethyl, were synthesized through the benzidine rearrangement reactions of hydrazo compounds. From these diamines with pyromellitic dianhydride a series of soluble poly(amic acid)s were synthesized and then converted to the corresponding polyimides in thin films. For the polyimides, structure and properties were characterized by X-ray diffraction, prism-coupling, static and dynamic thermomechanical analysis, residual stress analysis, and stress-strain analysis. The structure of the rodlike poly(4,4'-biphenylene pyromellitimide) (PMDA-BZ) was influenced by the incorporation of the side groups. Among the properties, the brittleness was significantly improved by the incorporation of methoxy and trifluoromethyl groups, but not enhanced by the fluoro and methyl groups. In addition, the refractive index, dielectric constant and their anisotropies were reduced by the methoxy and trifluoromethyl groups. The other properties will be discussed in detail on the structure-property correlationships with considering the roles of side groups. Conclusively, we have demonstrated that poor properties of the fully rodlike polyimide can be improved by the incorporation of proper short side groups with keeping its advantageous properties. [*This study was supported by KOSEF (Contract Nos. 95-0501-08-01-3 & 961-0301-006-2) and by the New Materials Research Fund in 1997 from the Ministry of Education*].

Sym. G : Electro-packaging

POLYMERIC MATERIALS- II

E-THU-21

AN INNOVATIVE DIE ATTACH ADHESIVE FOR HIGH THERMAL MANAGEMENT, BING WU, KATHY JUN, TOM BORGHARD (ABLESTIK, Rancho Dominguez, CA USA)

Powerful high density devices are driving a need for greater heat removal capabilities. One approach to facilitate heat transfer is the use of highly filled, thermally conductive die attach adhesives. A patented technology by Ray Dietz et al offers 8-10 times higher thermal conductivity than ordinary conductive epoxy adhesives. This technology uses thermoplastic and/or thermoset polymer particles suspended in a solvent instead of dissolved in a diluent. This approach allows faster solvent evaporation and higher conductive filler content after cure.

Although this technology offers many advantages, an evaluation of Diemat's DM5030P/F701C showed severe resin bleed out on nearly all substrates, difficulty to achieve less than 1 mil bondline thickness, severe adhesive delamination when used to bond dies larger than 300 x 300 square mil, and poor workability as it is packaged in jars instead of syringes. These concerns led to the development of RP-316-1, a highly conductive die attach adhesive with improved properties compared to products offered by other suppliers.

This paper will discuss the improved heat removal capabilities of RP-316-1 and show JEDEC level 3 popcorn performance compared to gold eutectic solder.

E-THU-22

A MEARSUREMENT OF THE INTERFACIAL FRACTURE TOUGHNESS BETWEEN CHIP AND LEAD FRAME, J. H. KIM*(ME3053, Dep't of Mech. Eng., KAIST, Taejon, 305-701, Korea), H. K. HWANG**(KCC C.R.I., Kusung-myun, Yoin-si, Kyunggi-do, 449-901, Korea), S. B. LEE*, and Y. Y. EARMME*.

The experiments to measure the interfacial fracture toughness between chip and lead frame(L/F) are performed. The cantilever specimen, which is composed of chip, copper L/F and epoxy based adhesive paste and has almost the same thickness with the electronic package used in industry, is prepared to get the load-displacement curve with various temperatures and under 85 ℃/85 %RH environmental condition. The F.E.M. is employed to obtain the value of the energy release rate for the specimen at the load drop point appearing in each load-displacement curve.

The value of the interfacial fracture toughness, between chip and L/F, is minimum around the Tg(130 ℃) of the chip attach adhesive. The value of the interfacial fracture toughness is decreasing with the increase of the exposure time under 85 ℃/85 %RH environmental condition. The interfacial adhesion between adhesive and L/F is compared with that between chip and adhesive under 85 ℃/85 %RH environmental condition.