TITLE: FTIR BASED IDENTIFICATION METHOD OF UNDERFILL MATERIALS AND MATCHING SYSTEM

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Abstract

Epoxy-based underfill materials are used in microelectronic packaging to reduce coefficient of thermal expansion (CTE) between the organic substrate and the silicon device and thermal stresses on the solder joints. Using the correct material properties of underfill materials can make fatigue life prediction using finite element method (FEA) more accurate. Therefore, identification method for cured underfill materials from assembly printed circuit board (PCB) is studied in this paper. Due to the tiny size, insoluble in organic solvent and hard to harvest, the Fourier-transform infrared spectroscopy microscope Attenuated total reflectance (FT-IR Microscope ATR) have been determined as the proper method to identify the underfill materials from assembly PCB. In this study, Using the Thermo-Nicolet 8700 with KBr beam splitters and ATR with Germanium crystal test specific underfill materials. Spectral combination method is used to exhibit peaks from each component of heterogeneous underfill mixture. Fingerprint region (from about 1500 to 500 cm^{-1}) which is due to all manner of bending vibrations within the molecule is the unique characterization for each underfill. Comparing the fingerprint region of each material, the peak value can effectively and efficiently identify different kinds of underfill. The underfill materials matching system program is also carried out based on the FTIR spectrum result.