kester

International Microelectronics Assembly and Packaging Society

One Step Chip Attach Materials (OSCA) for Conventional Mass Reflow Processing

ABSTRACT
One step chip attach (OSCA) materials are dispensable polymeric materials for flip chip assembly, which are designed to flux metallic interconnections and subsequently turn into an underfill upon curing. OSCA materials enable a drastic simplification of the assembly process by combining the reflow (fluxing/soldering), defluxing and capillary underfilling steps used in traditional processing into a single step. One key challenge for the design of OSCA materials is timing the cure kinetics with fluxing activity and solder reflow during processing. A second key challenge is to factor a process-friendly rheological design into formulation. The OSCA material rheology must allow for high filler loading levels, seamless integration with standard dispensing equipment, flow control during and after dispense (avoid keep out zones), flow during the die placement (elimination of voids), after placement (fillet formation) and during reflow. The final key requirements for a functional device are defect-free interconnections combined with optimal thermos-mechanical and water resistant properties of the final underfill to guarantee the long-term reliability of the assembly in various environmental conditions. This paper presents the properties of materials designed by Kester for use in mass reflow processing (OSCA-R). The rheological design principles behind a seamless integration into customer-friendly processes will be presented in additional results illustrating the timing of cure kinetics with fluxing and soldering events during processing will be discussed. Preliminary device reliability results will also be presented for several types of test vehicles including; Si-Si and Si-FR4.

Key Words
Adhesive, flip chip, fluxing, no-flow, non-conductive paste, reflow, soldering, underfill