COMPUTATIONAL SIMULATION OF FLIP-CHIP UNDERFILL ENCAPSULATION PROCESS

FLOW SIMULATION

A two-dimensional numerical model is used to simulate the one-side dispensing underfill encapsulation process between the chip and the substrate. **A Volume of Fluid (VOF) model** is integrated with the surface-tension model and the wall adhesion model to trace the flowing leading edge evolution driven by capillary force. It is shown that moving time of the flow leading edge is proportional to the viscosity and square of flow distance, inversely proportional to the surface tension and the gap distance between the chip and substrate. Figures 1 to 4 give an example of numerical simulation for the underfill flow between the chip and the substrate. The numerical results are compared with the analytical and experimental results, where the efficiency has been demonstrated.

MODELS USED IN FLUENT

- VOF Free Surface Model
- Surface Tension Model
- Wall Adhesion Model

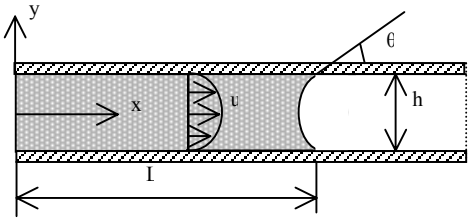

Fig.1 Underfill flow between the chip and substrate

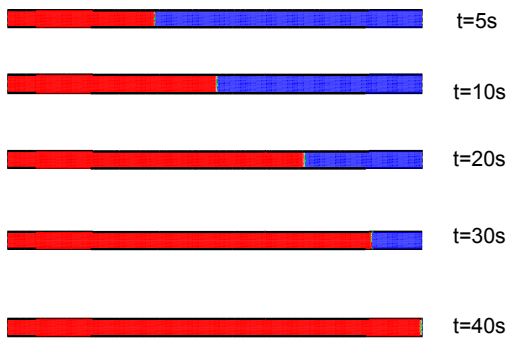

Fig.2 Propagation of flow leading edge with time

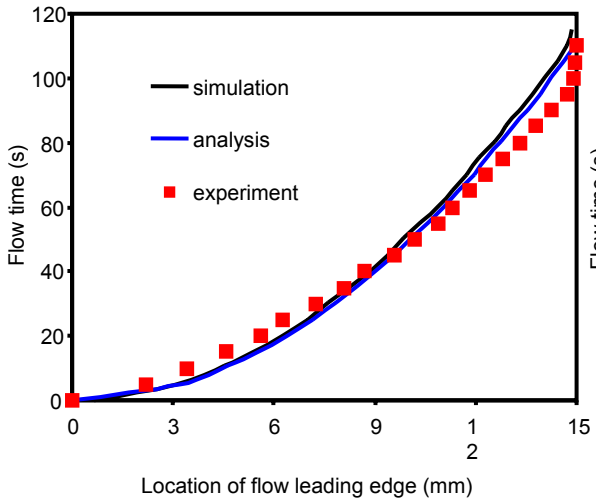

Fig. 3 Comparison of simulation, analytical and experimental result under 50μm gap distance

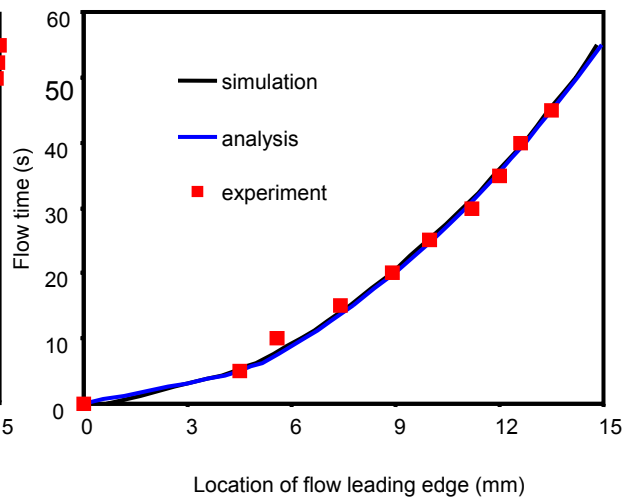

Fig. 4 Comparison of simulation, analytical and experimental result under 50μm gap distance