Thermal properties and mechanical properties of dielectric materials for thermal imprint lithography

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Abstract : Increasingly complex tasks are performed by computers or cellular phone, requiring more and more memory capacity as well as faster and faster processing speeds. This leads to a constant need to develop more highly integrated circuit systems. Therefore, there have been numerous studies by many engineers investigating circuit patterning. In particular, PCB including module/package substrates such as FCB (Flip Chip Board) has been developed toward being low profile, low power and multi-functionalized due to the demands on miniaturization, increasing functional density of the boards and higher performances of the electric devices. Imprint lithography have received significant attention due to an alternative technology for photolithography on such devices. The imprint technique. is one of promising candidates, especially due to the fact that the expected resolution limits are far beyond the requirements of the PCB industry in the near future. For applying imprint lithography to FCB, it is very important to control thermal properties and mechanical properties of dielectric materials. These properties are very dependent on epoxy resin, curing agent, accelerator, filler and curing degree(%) of dielectric materials. In this work, the epoxy composites filled with silica fillers and cured with various accelerators having various curing degree(%) were prepared. The characterization of the thermal and mechanical properties wasperformed by thermal mechanical analysis (TMA), thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), rheometer, an universal test machine (UTM).

Key Words : Epoxy resin, curing agent, mechanical properties, imprint lithography