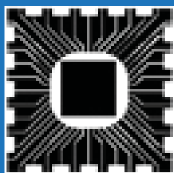

Micro-interconnects Using Mono-sized Polymer Microspheres for Large Format High Resolution Sensor Packaging

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Challenges and bottlenecks remain in the endeavour to deliver ultra-fine pitch interconnects for µBGA and flip-chip devices. There are two major factors that are of particular concern in the acquisition of such future generation technologies: i) the complexity associated with the micro-scale deposition of materials, and ii) the achievement of acceptable yields. As for the assembly equipment, alignment and bonding processes will become extremely critical. While the demands on reducing the gap between silicon foundry and wafer level packaging have so far been delivered, through various concepts including System in Package and System on Package, the search continues for assembly processes that are capable of interconnects at a pitch close to 10 microns to meet current and future demands of highly functional semiconductor devices. This project is to carry out a feasibility study to enable such finer pitch interconnects through the use of novel materials and processes.

The proposed work will use monosized metal coated polymer based micro-spheres specially fabricated by Conpart, a Norwegian company, to achieve ultrafine pitch interconnects by replacing traditional solder joints. Due to the unique polymerisation process used to fabricate the particles, their size and the chemical and mechanical properties can be tailored, with extreme accuracy and reproducibility. This, combined with metal plating technology, makes these spheres ideal as conductive elements which have been widely used in the anisotropic conductive adhesives (ACAs) used in flat panel display assembly. The extension of this technology to the direct replacement of solid solder balls in µBGA and flip-chip assembly is currently of great interest for increasing the compliancy of the interconnections as a route to improved product reliability under thermal fatigues and shock loading. This feasibility study will explore the possibility of creating interconnections with such mono-sized polymer spheres for applications which demand connection pitches as fine as 10 microns, such as in X-ray detectors.