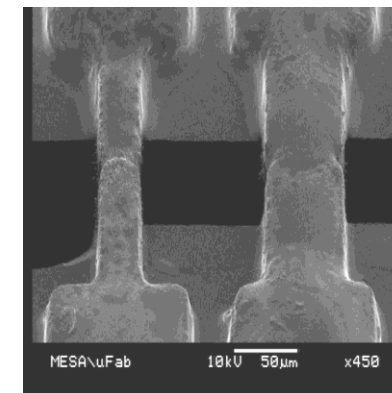
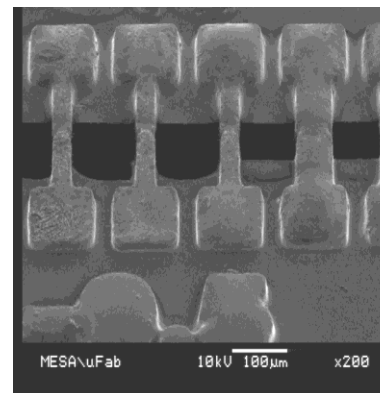


Development of Ultra Dense Edge Interconnects for Die to Die Connections Based on Immersion Solder Bridging

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Description

- A high density 2-D integration process that involves linking multiple die along their edges using a linear array of solder bridges was explored.
- Solder bridging is a versatile approach that was compatible with a range of interconnects geometries and metallizations.
- Demonstrated this approach using copper plated nodules that overhang the edge of the die. These nodules were 25 microns (μm) thick with 10, 20, and 50 μm widths.
- The formation of solder bridges can be accomplished using immersion soldering.
- Due to surface energy effects, the solder selectively wets and flows along all wettable metal surfaces to form a strong solder bond.
- The solder can flow across gaps (15 microns).



Approach

- **Nodule**
 - Nodule Formation
 - Nodule Photolithography and Plating
 - Nodule Placement and Alignment
- **Immersion solder**
 - Solder wettability
 - Solder thickness control
 - Overhanging nodules Solder bridging
 - Effect of geometry on solder bridging
 - High-density surface die-to-die interconnects

Conclusion

- Experimental results have shown the feasibility of immersion soldering for edge surface interconnect packaging.
- The method was applicable to overhanging nodules.
- Solder bridges can be made between features that were located at the die edge, but do not overhang the edge, thus enabling simpler fabrication processes for future applications of edge surface nodule interconnect.
- Immersion soldering appears to be a viable technology for surface nodule interconnect and has shown to be applicable to a range of geometries and dimensions.