Preliminary Characterisation of Low-Temperature Bonded Copper Interconnects for 3-D Integrated Circuits.

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Abstracts – Three dimensional (3-D) integrated circuits can be fabricated by bonding previously processed device layers using metal-metal bonds that also serve as layer-to-layer interconnects. Bonded copper interconnects test structures were created by thermocompression bonding and the bond toughness was measured using the four-point test. The effects of bonding temperature, physical bonding and failure mechanisms were investigated. The surface effects on copper surface due to pre-bond clean (with glacial acetic acid) were also looked into. A maximum average bond toughness of approximately 35 J/m² was obtained bonding temperature 300°C.