

Thin hybrid pixel assembly fabrication development with backside compensation layer

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ATLAS will replace the entire tracking system for operation at the HL-LHC. This will include a significantly larger pixel detector of approximately 8 m². It is critical to reduce the mass of the pixel modules and this requires thinning both the sensor and readout to about 150 micrometers each. The bump yield in thin module assembly using solder based bump bonding can be problematic due to wafer bowing during processing at high temperatures. A new bump-bonding process using backside compensation on the readout chip to address the issue of low yield will be presented. Results from characterization of assemblies produced from readout wafers thinner to 100 micrometers and the effect of applying backside compensation will be presented. Bond yields close to 100% have been measured using the FEI4 readout chip.

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