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Ultra-thin hybrid pixel detectors using Wafer-to-Wafer bonding

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Wafer to wafer bonding offers an economic approach to interconnect all readout electronic chips with the solid-state sensor chips on the wafer by only one bonding step. This is a promising technology for the fabrication of 3D integrated ultra-thin hybrid modules for particle detection and timing layers in future particle detectors. The technology described in this paper combines the metal-metal interconnection of pixels by Cu-Sn pillar bumps and the wafer level bonding by a photo-patterned polymer layer. In comparison to the metal-oxide-hybrid bonding process established in the industry for high volume production the metal-polymer hybrid wafer to wafer bonding process is applicable for wafers with higher surface topography tolerances. In this project TimePix3 wafers are used together with a passive sensor wafer built with LFoundry 150 nm technology to proof the concept. The project will be introduced and recent results from the process development and sensor design and fabrication are presented.

Type of presentation (in-person/online)

in-person presentation

Type of presentation (scientific results or project proposal)

Presentation on scientific results

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