

Development of pixelated silicon sensor integrated with junction field effect transistor

Monday, 25 May 2020 19:54 (5 minutes)

We fabricated a pixelated silicon sensor with junction field effect transistor (JFET) on a 650 μm -thick, high resistivity ($> 5 \text{ k}\Omega\cdot\text{cm}$) n-type and double-sided polished 6-inch silicon wafer using double-sided fabrication process. The JFET with cylindrical structure acts as a switch to readout charges accumulated in the pixelated sensor. We presented electrical characteristics of the fabricated pixelated silicon sensors integrated with the JFET with a size of $100\times 100 \mu\text{m}^2$. The drain currents as a function of the drain voltage for different the gate voltages were measured to verify the performance of the JFET as a switch and we determined the optimized design parameters of the pixelated sensor to provide the proper functioning of the switch. LEDs and X-rays were irradiated to the fabricated pixelated silicon sensor integrated with the JFET to measure the sensor's response and the results were also presented.

Funding information

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Session Classification: Poster

Track Classification: Sensors