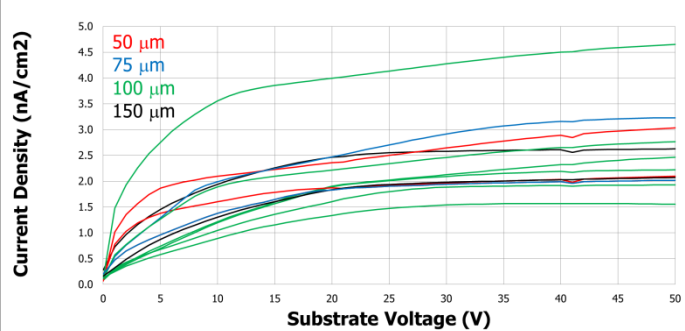


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- ✓ Thin pixel devices on epitaxial material are a natural choice to fulfill the request of rad-hard performances and low active volume.
- ✓ The sensor is a p-on-n pixel, based on PANDA experiment design, realized starting from epitaxial silicon wafers, in which the sensitive area is the epi-layer itself, while the low-resistivity substrate acts as a mechanical support.
- ✓ After completion of the fabrication, the substrate is back thinned down to a value slightly larger than the epitaxial layer thickness, which can be in the order of 50-150 μm .

characterization BEFORE thinning

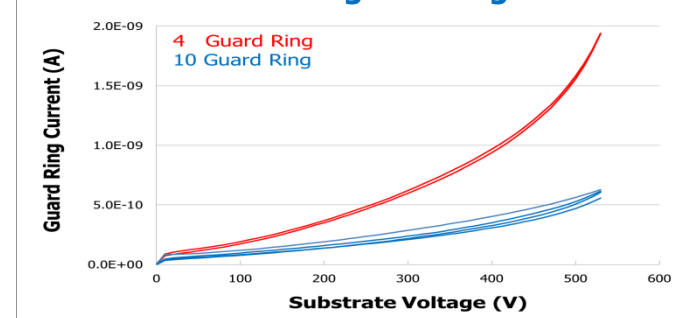
I-V of 4mm² test diodes



The leakage currents show a spread in the range from 1 to 4 nA/cm² and seem to be not dependent on the epi thickness

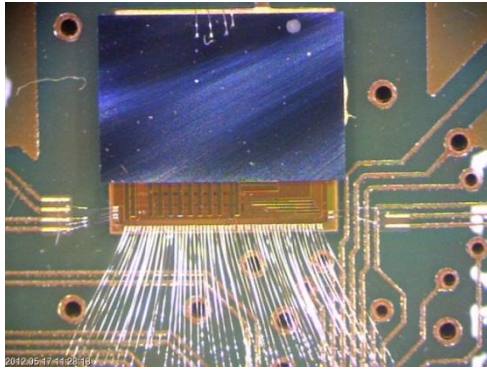
characterization AFTER thinning

I-V on multi guard ring diode

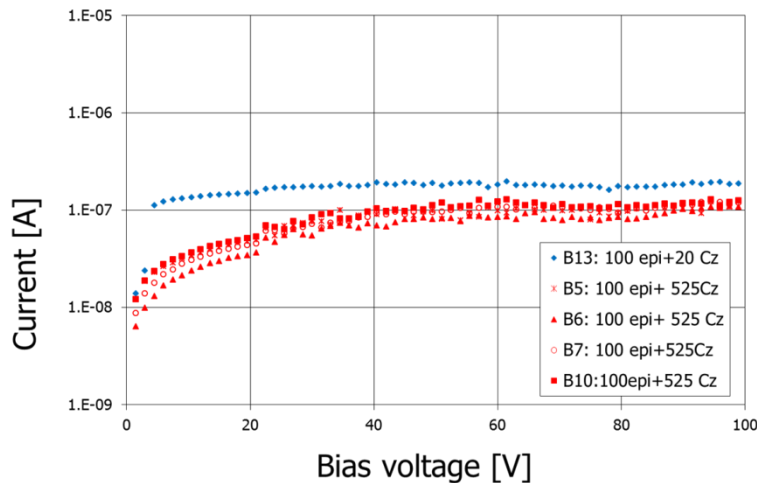
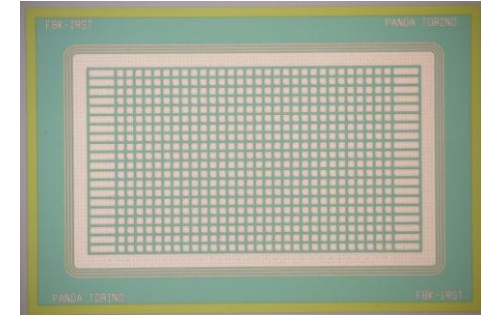


High Breakdown Voltage equal before and after thinning, no degradation of the electrical parameters

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- wafer thinning and bump-bonding by IZM
- The readout chip is ToPix_v3 (developed @INFN-Torino) The sensor is composed by
- 32X20 pixels (pitch 100 μm x 100 μm)



IV measurements of bump bonded sensors as obtained with (blue) or without (red) thinning process. Each prototype includes 640 pixels.

- ✓ The measurement does not show a breakdown up to 100 V (typical $V_{\text{depl}} \sim \text{few volts}$).
- ✓ The observed difference of the two measured leakage currents is in the range of typical spread evaluated by test structures.

Next Steps

- ✓ New thinned detectors will be delivered in June and additional measurements are planned. More statistics will help to understand the bumping and thinning processes reliability.
- ✓ Rad hard characterization