# Appendix of SOI Pixel Detectors

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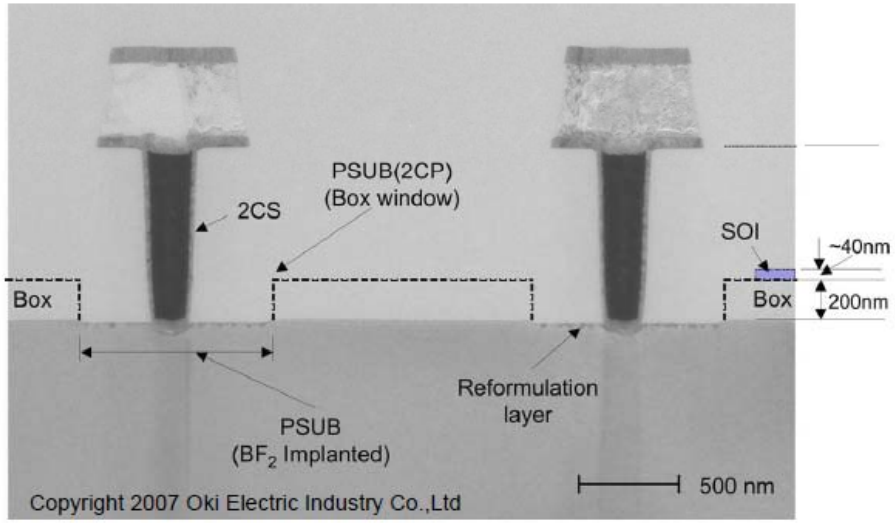
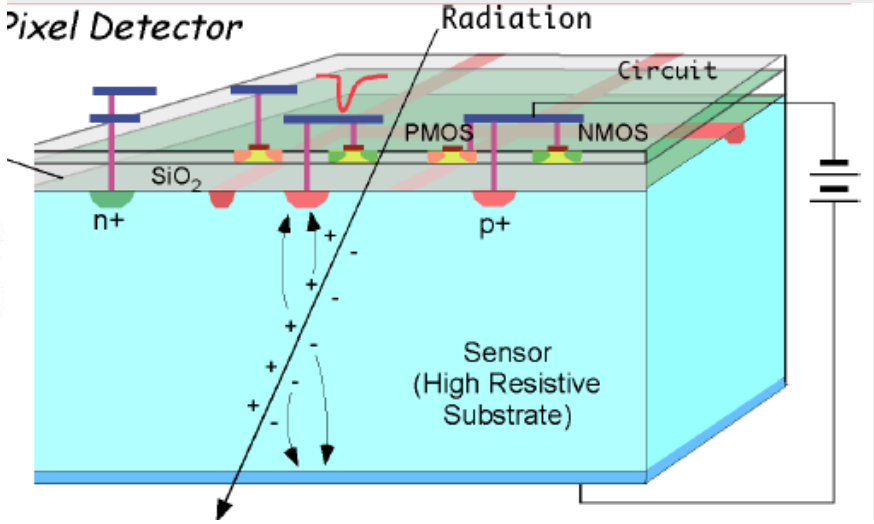
# SOI monolithic Pixel Detector as MAPS

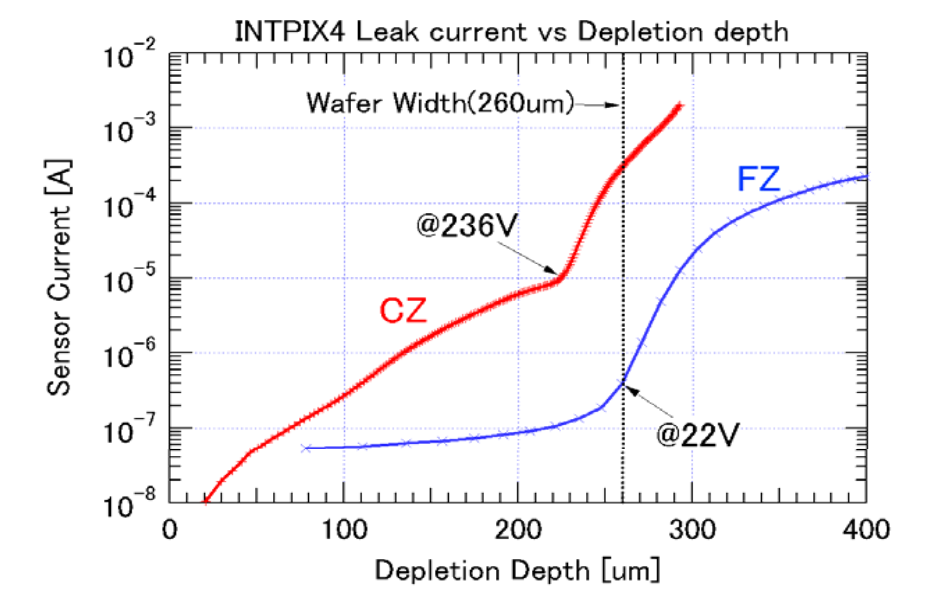
- Pros
  - Cost benefit due to mass production process;
    - 0.20 μm Low-Leakage FDSOI (OKI Semi.) commercial process, 8".
  - Large sensor area (up to 8" size).
  - High Speed readout & complex readout functionality are implementable.
    - e.g. Local trigger & local buffer/FIFO
  - Full depletion (2-300μm) as monolithic detector or Low voltage operation.
- Cons
  - Special process such as back side implantation is difficult at OKI semiconductor (our foundry)
    - Need to cooperate with other lab's process.



# Full depletion of 260 μm FZ wafer (up to 725 μm)

- As SOI Pixel detector is fabricated in standard LSI process, which include 1100 ° C baking, wafer resistivity reduced less than 1 kΩ cm.
  - CZ SOI wafer : 700 Ω cm →Full depletion voltage ~300V@260 μm thickness
- We have tested FZ SOI wafer, which contains a few oxygen, keeps ~10 k Ω cm resistivity after fabrication process, shows full depletion of 260 μm sensor at 22V.



# Summary

- SOI pixel detector is a novel monolithic pixel detector without bump-bonding.
  - Low mass, Fine-pitch, Low noise, intelligent architecture.
- SOI pixel is novel detector with various advantages and fabricated in the commercial process.
- Due to using commercial process, some limitation is exist.
- We need to cooperate with other lab's process to overcome these limitation to achieve target Detector at PHENIX.