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First results on the charge collection efficiency of heavily irradiated microstrip sensors fabricated on oxygenated p-type silicon.

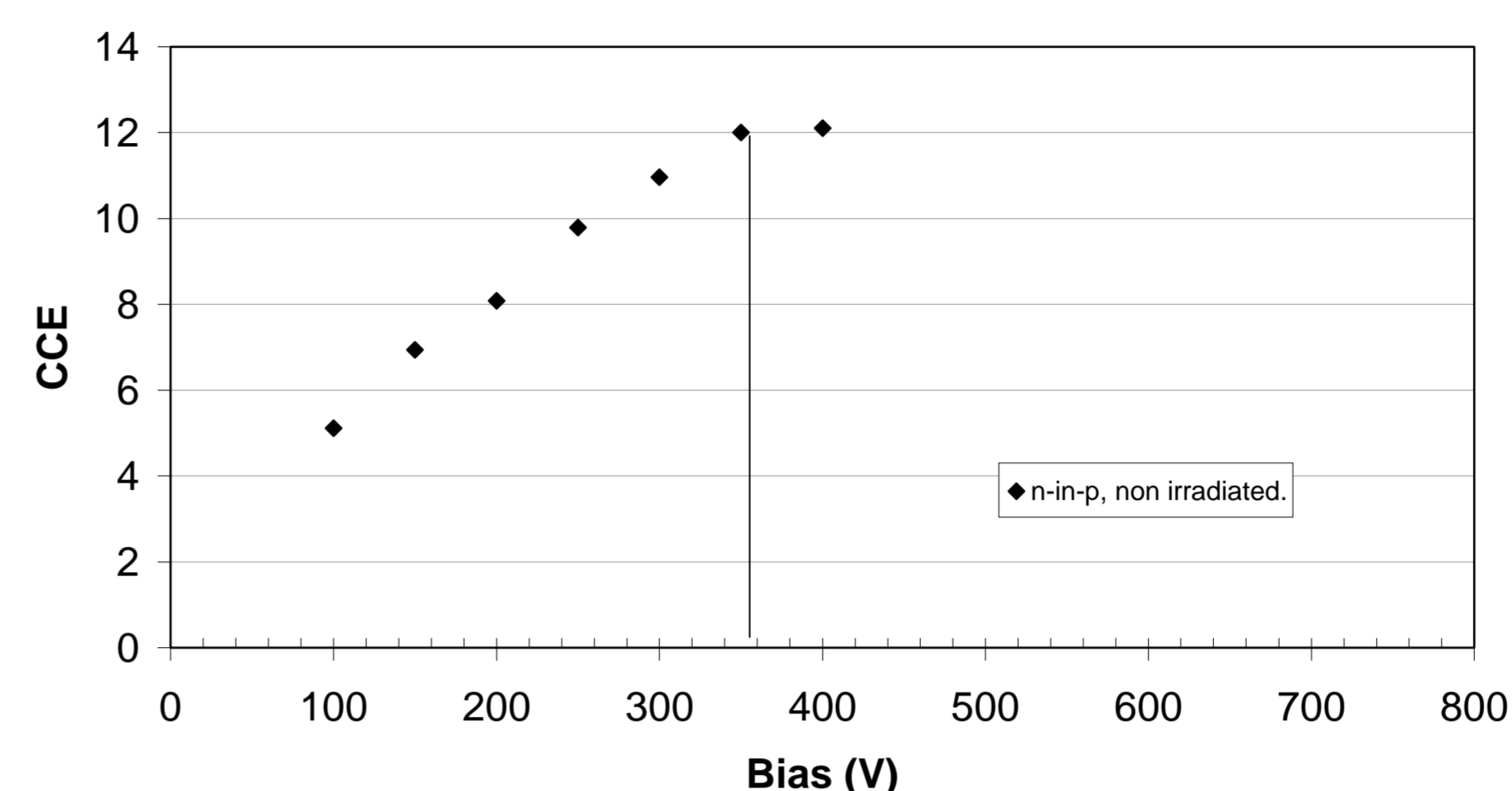
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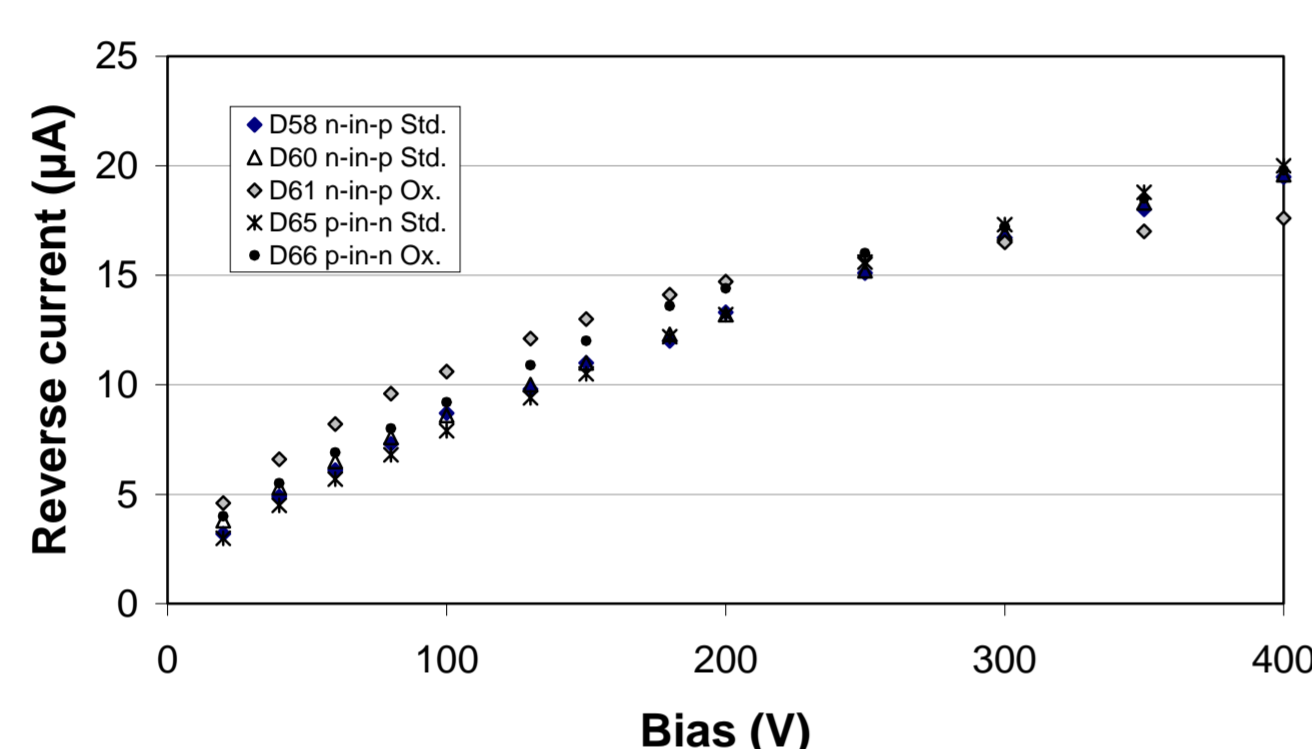
2 sets of variously flavoured detectors have been produced by CNM using a Liverpool designed mask-set. Four type of substrate were used: n-type with and without O, n-type with and without O. [O] calculated to be $\geq 10^{17} \text{ cm}^{-3}$ throughout the wafer.

The 2 sets have been irradiated to 2.7 and $11.5 \cdot 10^{14} \text{ p cm}^{-2}$ in the CERN-PS, Irrad-1 facility, at room temperature and un-biased.

After irradiation they were kept at low temperature.

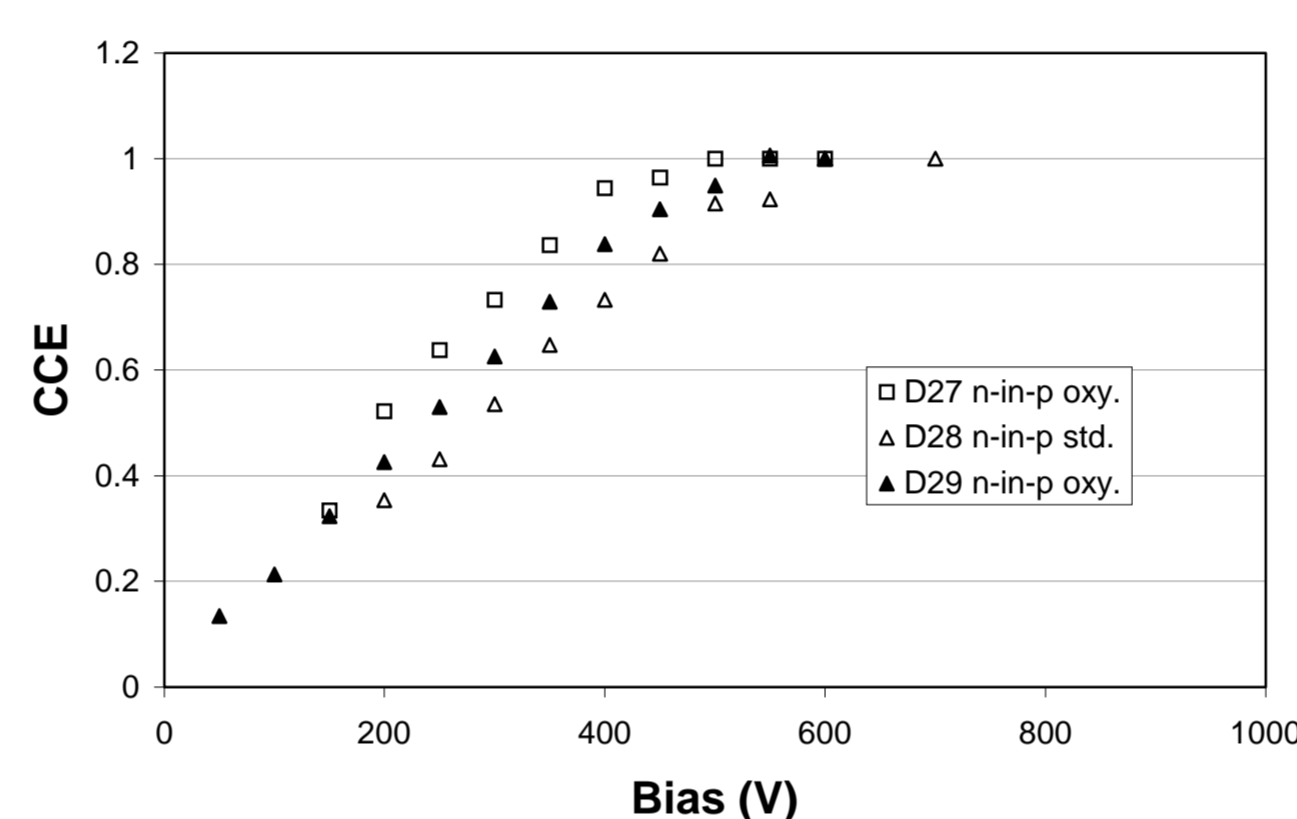


The CCE curve before irradiation of n-in-p detectors shows
A full depletion voltage of $\sim 350 \text{ V}$.

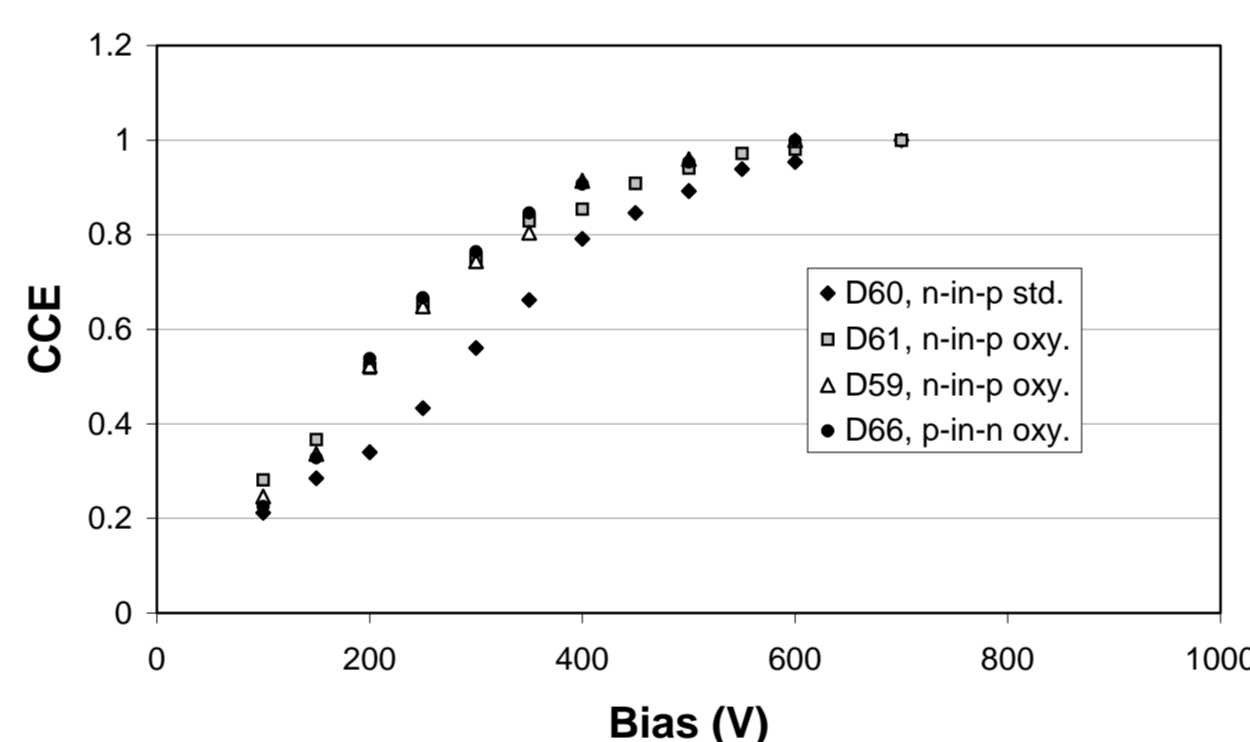


Reverse currents after $1.1 \cdot 10^{15} \text{ p cm}^{-2}$

The reverse current gives a first indication of a difference in full depletion voltage between oxygen enriched and standard p-type substrates.

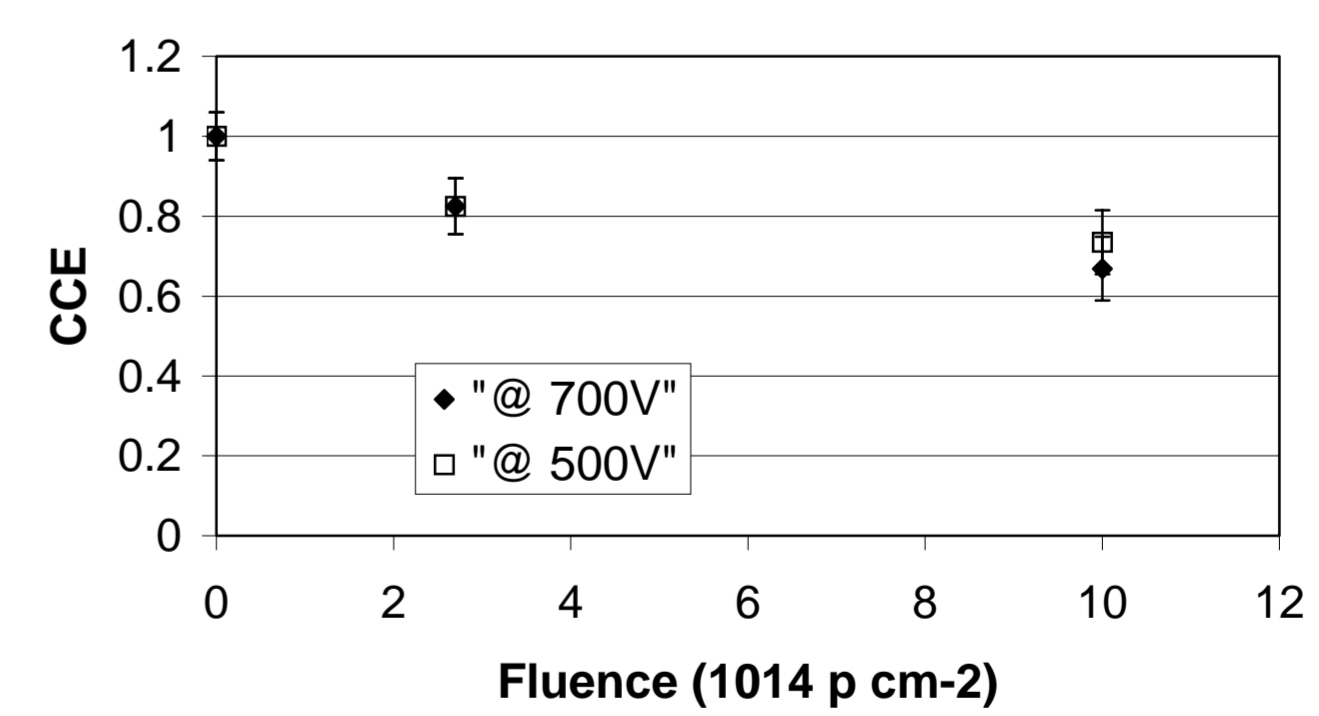
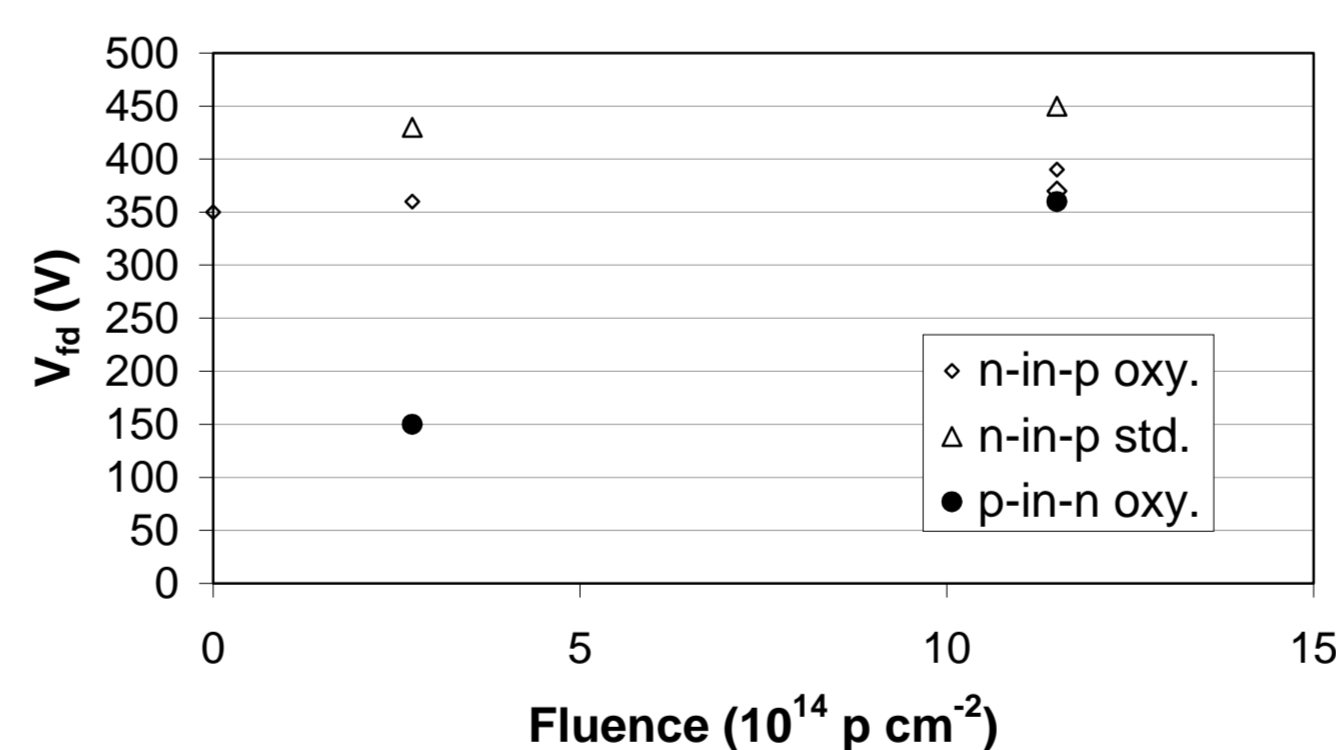
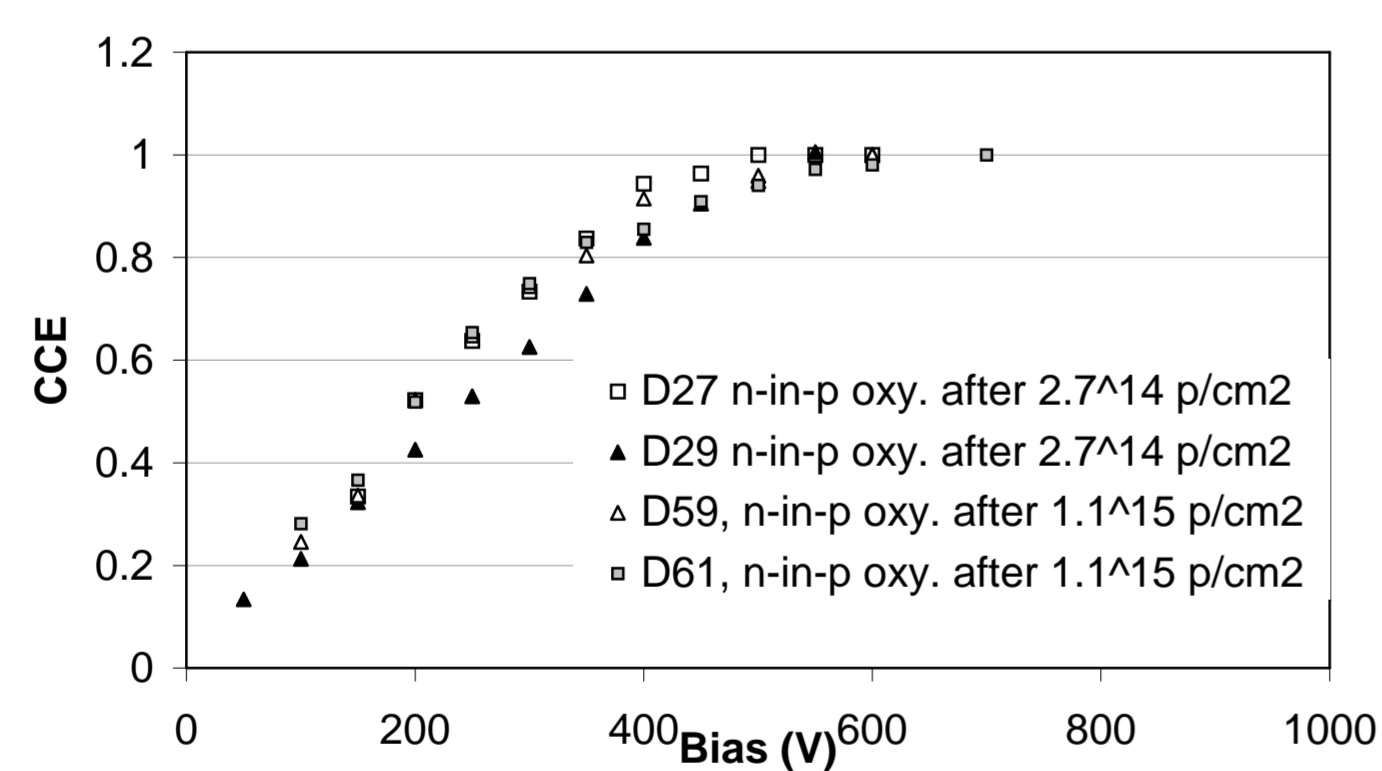


Charge collection with n-in-p detectors after $2.7 \cdot 10^{14} \text{ p cm}^{-2}$.
The presence of oxygen has small influence on the full depletion voltage.



Charge collection with n-in-p detectors after $1.1 \cdot 10^{15} \text{ p cm}^{-2}$.
Again, the presence of oxygen has small influence on the full depletion voltage.

N-in-p with oxygenated substrate at the two different doses. The full depletion voltage does not vary much.



CONCLUSIONS

- Oxygenated p-type substrate has been successfully used to produce miniature micro-strip detectors
- The p-type substrates show CCE properties at least as good as n-type substrates
 - ⇒ since n-in-n micro-strip detectors show significantly lower voltages required for a given CCE, n-in-p should offer the same advantage but without the need for double-sided processing
- The oxygenated p-type detectors show less dependence of the full depletion voltage on dose.
 - ⇒ this may be due to the lower resistivity starting material and/or due to the non-inversion of the substrate
- Further studies with initial higher resistivity of the p-type substrate are needed to qualify this substrate as a detector material.