**Abstract:**

This paper presents an analysis of the operation of lateral thin-film SOI PIN photodiodes for the detection of short wavelengths. Experimental measurements were done varying the back-gate bias in order to point out the performance of this photodetector in more advanced technologies.

**Results:**

Optical detection at short wavelengths close to blue and UV wavelengths is similar to that of experimental data, however, as the intrinsic length decreases, the effect of back-gate bias is less pronounced, because the device becomes fully depleted, reducing the carrier recombination. On the other hand, the performance of different intrinsic doping concentrations is presented.

**Conclusion:**

In this work, the influence of back-gate bias and the intrinsic length variation on the performance of lateral SOI PIN photodiodes was presented. Experimental results demonstrated that the operation mode of the photodiodes was affected by back-gate bias, modifying the photocurrent characteristics, which presents its maximum value when the silicon film is laterally depleted, indicating minimal carrier recombination. Two-dimensional numerical simulations were used to reproduce the experimental data and showed that the choice of the intrinsic length ($L_i$) and consequently the number of fingers is crucial for the responsivity of the photodetector. The results showed that the higher photocurrent was obtained for $L_i$ around 10, indicating minimum recombination effect in this condition.

**References:**


**Acknowledgments:**

The authors acknowledge CNPq, FAPESP and FAPESP - FAPESP for the financial support to this work and M. de Souza and M. Pavanello for intellectual support and access to UCL partnership.

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**Figures:**

- **Figure 1:** Cross-Section of PIN SOI Photodiode
- **Figure 2:** Normalized photocurrent as a function of $V_D$
- **Figure 3:** Photocurrent as a function of $V_BG$, for different $V_D$
- **Figure 4:** Photocurrent as a function of $V_BG$, for different $L_i$
- **Figure 5:** Photocurrent as a function of $V_BG$, for different $N_i$