

下視網膜植入晶片之太陽能電池佈局架構對電流
效率的影響

**THE INFLUENCE OF LAYOUT STRUCTURE ON
SOLAR CELLS' CURRENT EFFICIENCY FOR
IMPLANTED SUBRETINAL PROSTHESES**

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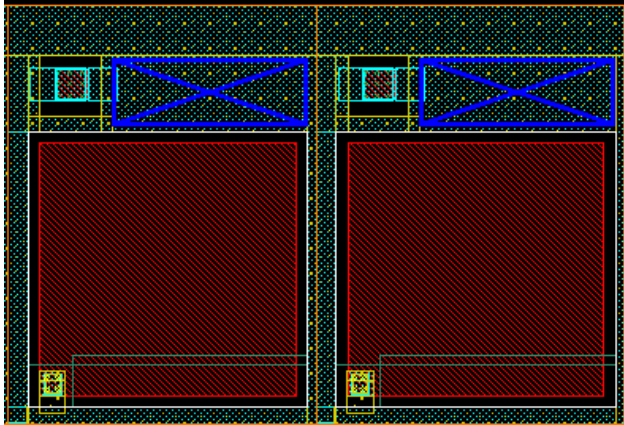
I. Background

Motivation

- **Enter the laboratory**
 - We're interested in biomedical electronics, especially implanted subretinal prostheses.
- **Improve and design solar cell**
 - Study how the layouts influence on the efficiency of the solar cell.

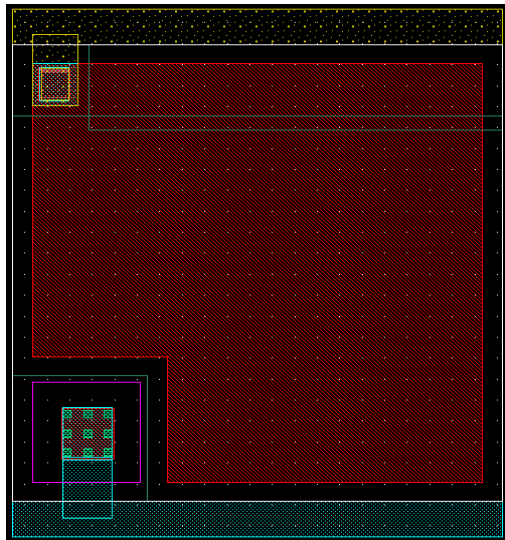
II. Different structure of layout

■ Structure #1(Same Ndiode)



TSMC 65nm process	
Total area(μm^2)	27291.0968
Efficient exposed area(μm^2)	12672
Availability(%)	46.4

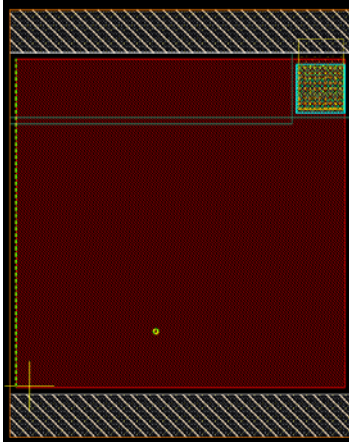
■ Structure #2 (Inside contact diode)



TSMC 65nm process	
Total area(μm^2)	23256.772
Efficient exposed area(μm^2)	12150
Availability(%)	52.2

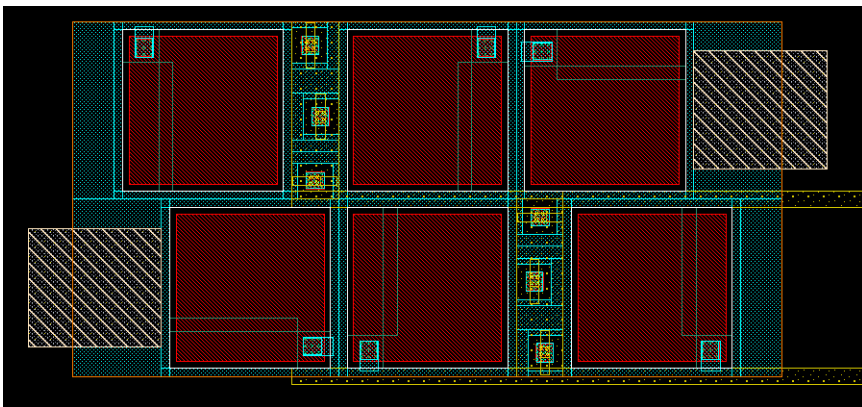
II. Different structure of layout

■ Structure #3 (Common contact 15*15 diode)



TSMC 65nm process	
Total area(μm^2)	20715.843
Efficient exposed area(μm^2)	12519.27
Availability(%)	60.43

■ Structure #4 (Wild contact diode)



TSMC 65nm process	
Total area(μm^2)	28826.23
Efficient exposed area(μm^2)	12523.4835
Availability(%)	43.38

III. Results

Up : current/efficient exposed area ; Down : current/total area (A/um²)

Structure Light Source	Same Ndiode	Inside contact diode	Common contact 15*15 diode	Wild contact diode
IR	1.63e-11	2.07e-11	2.11e-11	2.29e-11
	7.60e-12	1.08e-11	1.28e-11	9.93e-12
Red	9.78e-12	1.11e-11	9.90e-12	1.10e-11
	4.51e-12	5.79e-12	5.98e-12	4.77e-12
Blue	2.78e-11	3.18e-11	2.79e-11	3.25e-11
	1.29e-11	1.66e-11	1.69e-11	1.41e-11

IV. Conclusion

- **Wild contact diode** has the greatest value of “current/efficient exposed area.”
- **Common contact 15*15 diode** has the greatest value of “current/total area.”
- We expect the improved availability of each structure:
Same Ndiode: 59.12%, Common contact 15*15 diode: 71.79%
Inside contact diode: 58.2%, Wild contact diode: 63.5%
- If we fix the total area, with the improved availability, **Same Ndiode** is apparently the **worst** structure of all, while other structures have similar results.