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 interesting 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 ($\mu m^2$) 27291.0968
  - Efficient exposed area ($\mu m^2$) 12672
  - Availability(%) 46.4

- Structure #2 (Inside contact diode)
  - TSMC 65nm process
  - Total area ($\mu m^2$) 23256.772
  - Efficient exposed area ($\mu m^2$) 12150
  - Availability(%) 52.2
II. Different structure of layout

- **Structure #3 (Common contact 15*15 diode)**
  - TSMC 65nm process
  - Total area ($\mu m^2$): 20,715.843
  - Efficient exposed area ($\mu m^2$): 12,519.27
  - Availability (%): 60.43

- **Structure #4 (Wild contact diode)**
  - TSMC 65nm process
  - Total area ($\mu m^2$): 28,826.23
  - Efficient exposed area ($\mu m^2$): 12,523.4835
  - Availability (%): 43.38
## III. Results

Up : current/efficient exposed area ; Down : current/total area (A/\text{um}^2)

<table>
<thead>
<tr>
<th>Light Source</th>
<th>Structure</th>
<th>Same Ndiode</th>
<th>Inside contact diode</th>
<th>Common contact 15*15 diode</th>
<th>Wild contact diode</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR</td>
<td></td>
<td>1.63e-11</td>
<td>2.07e-11</td>
<td>2.11e-11</td>
<td>2.29e-11</td>
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<td>7.60e-12</td>
<td>1.08e-11</td>
<td>1.28e-11</td>
<td>9.93e-12</td>
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<tr>
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<td>1.10e-11</td>
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<tr>
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<td>1.29e-11</td>
<td>1.66e-11</td>
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<td>1.41e-11</td>
</tr>
</tbody>
</table>
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.