Impact of the Thicknesses of the p and p+ Regions on the Electrical Parameters of a Bifacial PV Cell

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Bifacial PV cell
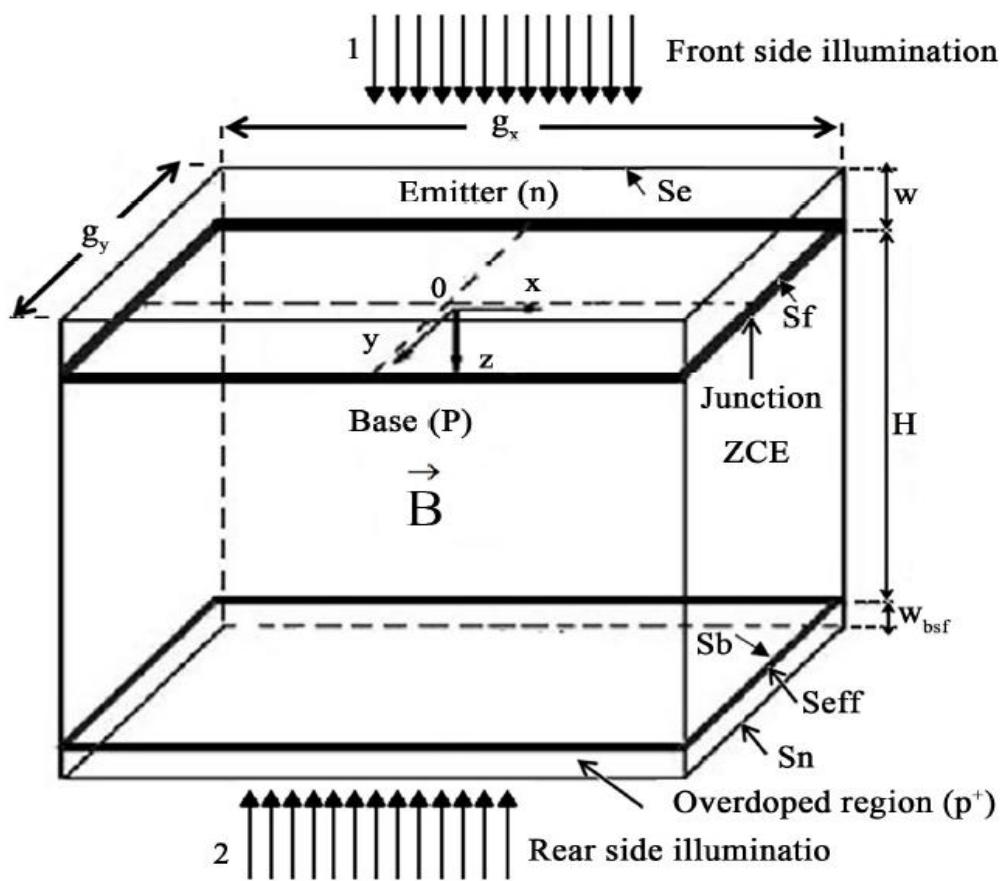
Figure 1. 3D model of the grain of bifacial silicon PV cell

➢ **Photocurrent density of the bifacial PV cell**

$$J\left(S_f,B\right)=\frac{eD_n^*}{g_x g_y}\int_{-\frac{g_x}{2}}^{\frac{g_x}{2}}\int_{-\frac{g_y}{2}}^{\frac{g_y}{2}}\left|\frac{\partial\delta_n\left(x,y,z\right)}{\partial z}\right|_{z=0} dxdy \quad (1)$$

➢ **Photovoltage of the bifacial PV cell**

$$V\left(S_f,B\right)=V_T\ln\left(1+\frac{1}{n_0}\int_{-\frac{g_x}{2}}^{\frac{g_x}{2}}\int_{-\frac{g_y}{2}}^{\frac{g_y}{2}}\delta_n\left(x,y,0\right)dxdy\right) \quad (2)$$

➢ **Electrical power of the bifacial PV cell**

$$P\left(S_f,B\right)=J\left(S_f,B\right)*V\left(S_f,B\right) \quad (3)$$

➢ **Form factor of the bifacial PV cell**

$$FF=\frac{P_{max}}{J_{cc}*V_{co}} \quad (4)$$

# Impact of the Thickness of the Base on the electrical parameters
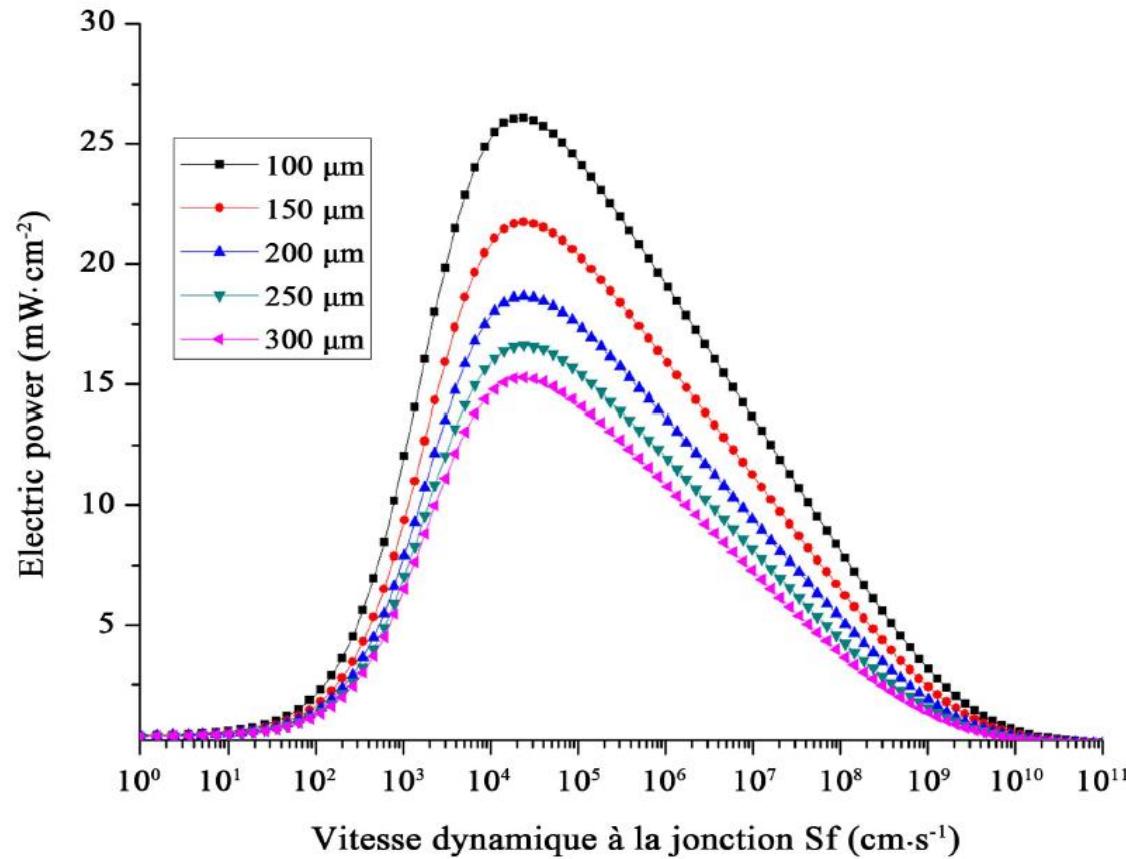
Figure 2. Electric power versus junction dynamic velocity for different thicknesses of the base region

H	P_{max}	V_{co}	J_{cc}	FF
(µm)	(mW/cm²)	(mV)	(mA/cm²)	(%)
100	26,07	730,95	46,81	76,19
150	21,84	712,68	40,29	76,06
200	18,64	697,15	35,52	75,27
250	16,62	682,29	32,49	74,97
300	15,27	667,49	30,68	74,56

table 1. values of electrical parameters

# Impact of the Thickness of p+ Region on the electrical parameters
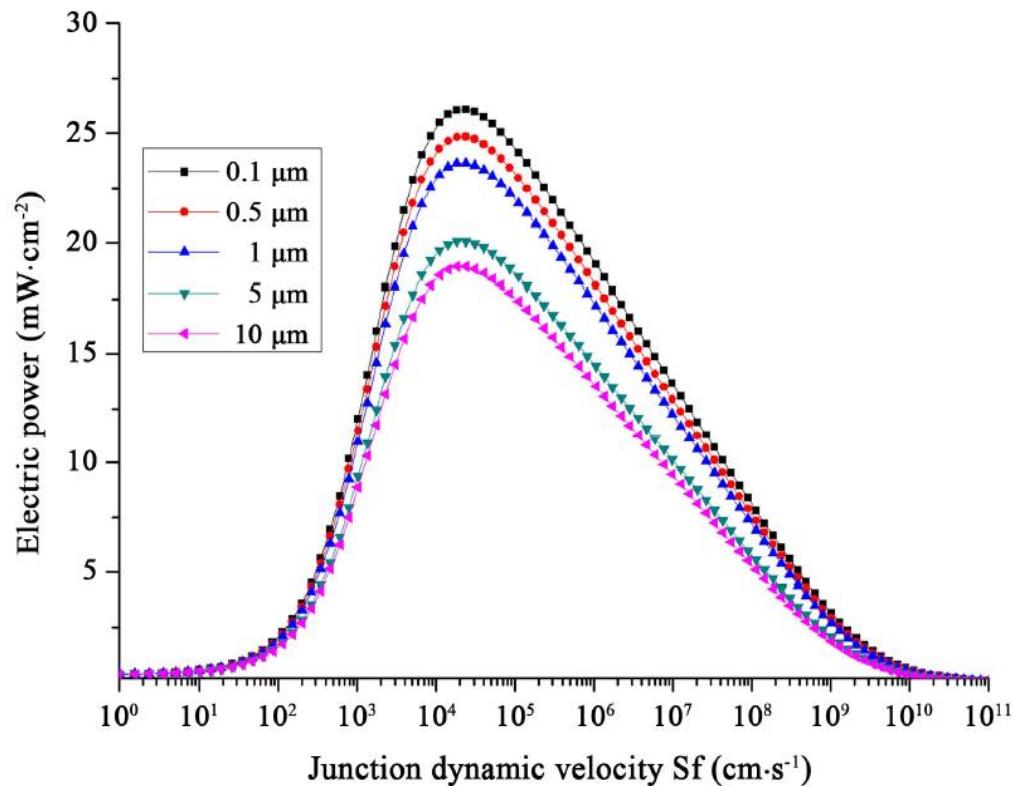
Figure 3. Electric power versus junction dynamic velocity for different thicknesses of the p+ region

W_{bsf}	P_{max}	V_{co}	J_{cc}	FF
(µm)	(mW/cm²)	(mV)	(mA/cm²)	(%)
0,1	26,07	730,95	46,81	76,19
0,5	24,83	727,95	44,81	76,12
1	23,64	724,71	42,89	76,05
5	20,08	711,80	37,23	75,77
10	18,92	705,87	35,44	75,63

table 2. values of electrical parameters

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Acknowledgements

Thank you