Bibliographical reference of the equations used in the simulation

Table S1. List of equations used in the simulation

Equation number	Calculated parameter	References
1	Absorption $A(\lambda)$	[1]
2	Relationship of absorption, transmition, and reflection)	[2]
3 and 4	S11 and S21 parameters for the absorption calculation	[3]
5	Ultimate absorption efficiency η	[4]
6 and 17	Current density J	[5,6]
7 and 8	intraband $\sigma_{\mathrm{int}\,ra}$ and interband $\sigma_{\mathrm{int}\,er}$ conductivity	[7]
9, 10, 11 and 12	generation g(x) and recombination r(x) rates, total generation rates G, and the total recombination rates R	[8,9]
13, 14, and 15	Average permittivity	[10-12]
16	Electric field	[13]
18	open-circuit voltage (Voc)	[14]
19	The fill factor (FF)	[15]

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