

Possibility of highly efficient 2D-3D perovskite/CIGS tandem solar cells with over 30% efficiency

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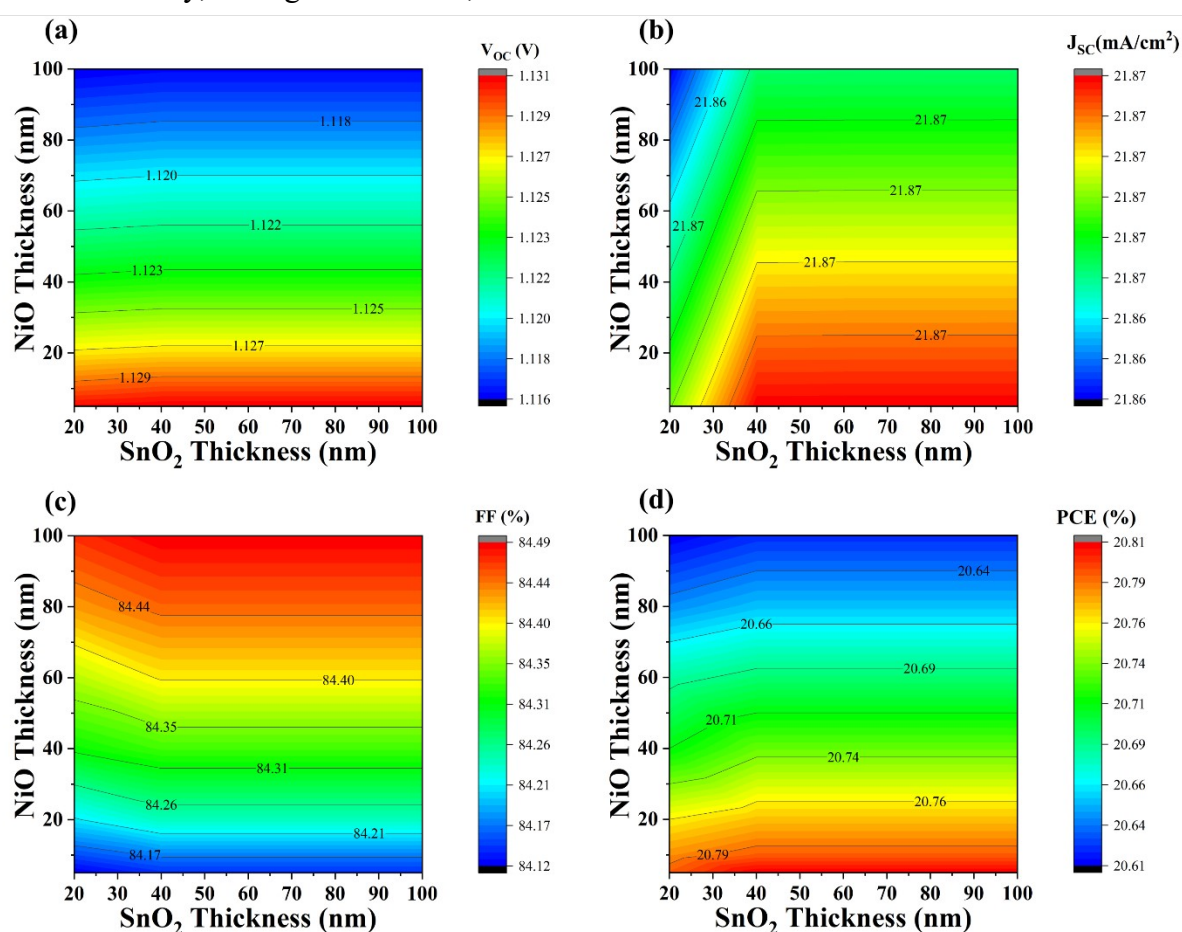


Fig. S-1 Distribution of photovoltaic parameters (a-d) as a function of NiO thickness and SnO₂ thickness in PSCs.

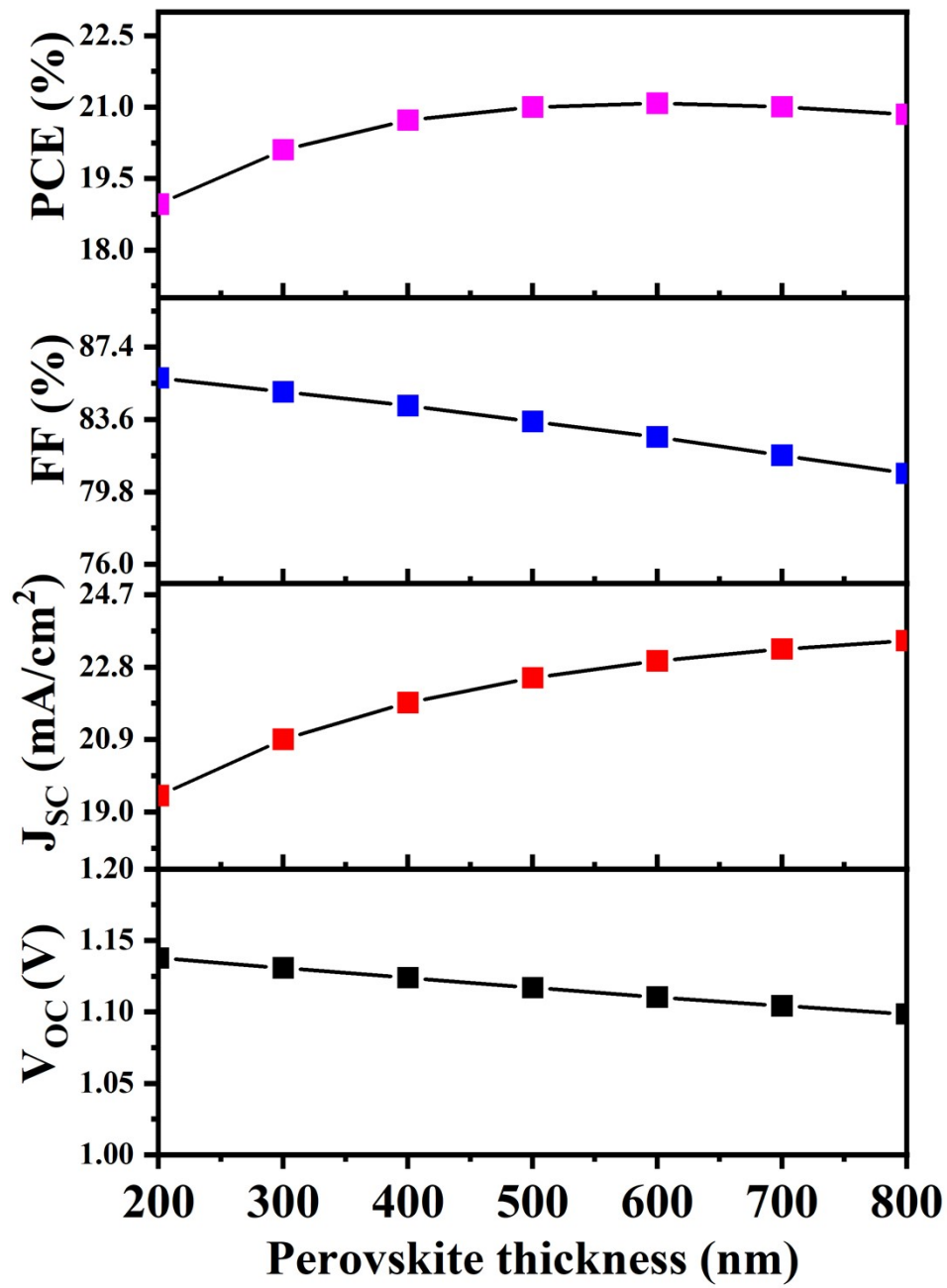


Fig. S-2. Effect of 2D-3D perovskite thicknesses on the photovoltaic parameters of PSCs.

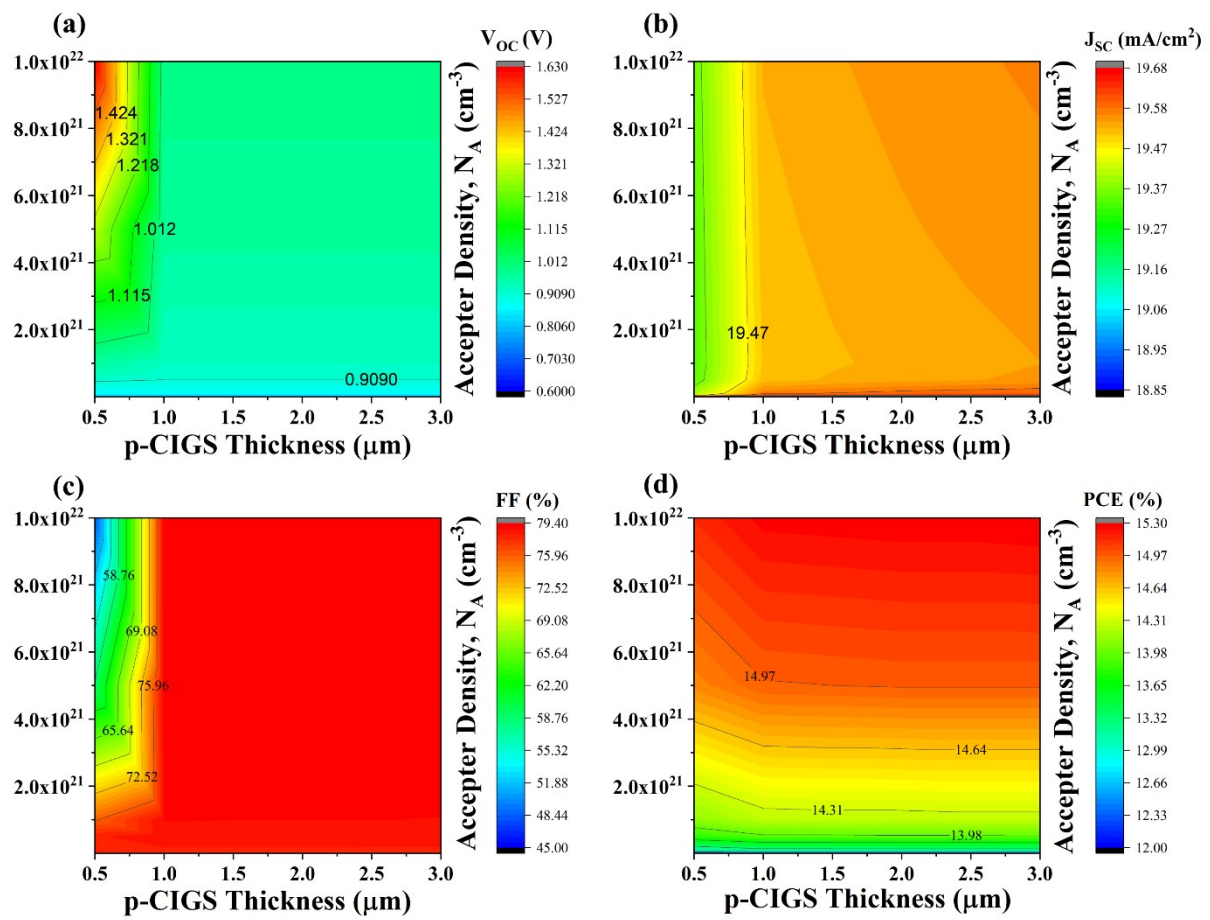


Fig. S-3 Distribution of photovoltaic parameters (a-d) as a function of acceptor density and p-CIGS thickness in CIGS/GaSe heterojunction solar cells.

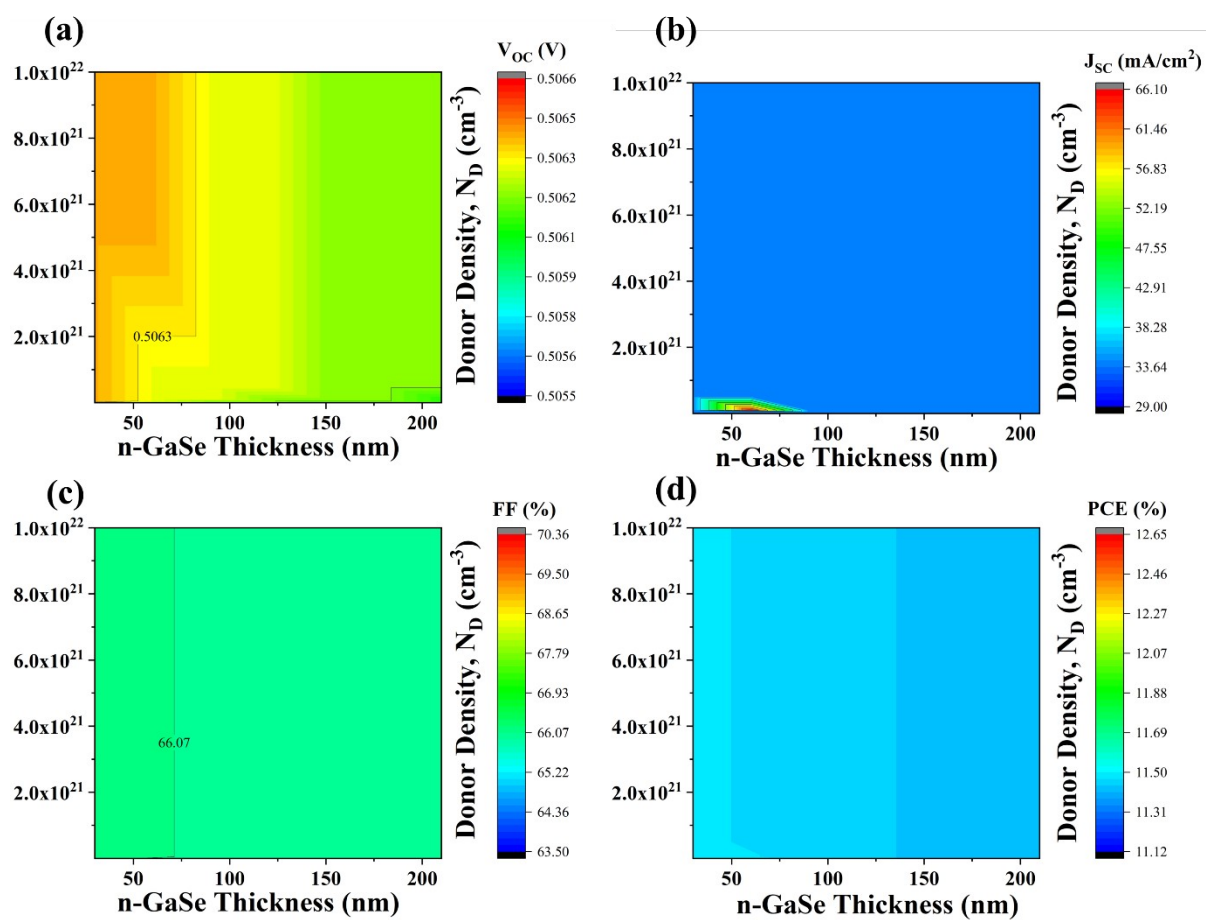


Fig. S-4 Distribution of photovoltaic parameters (a-d) as a function of donor density and n-GaSe thickness in CIGS/GaSe heterojunction solar cells.

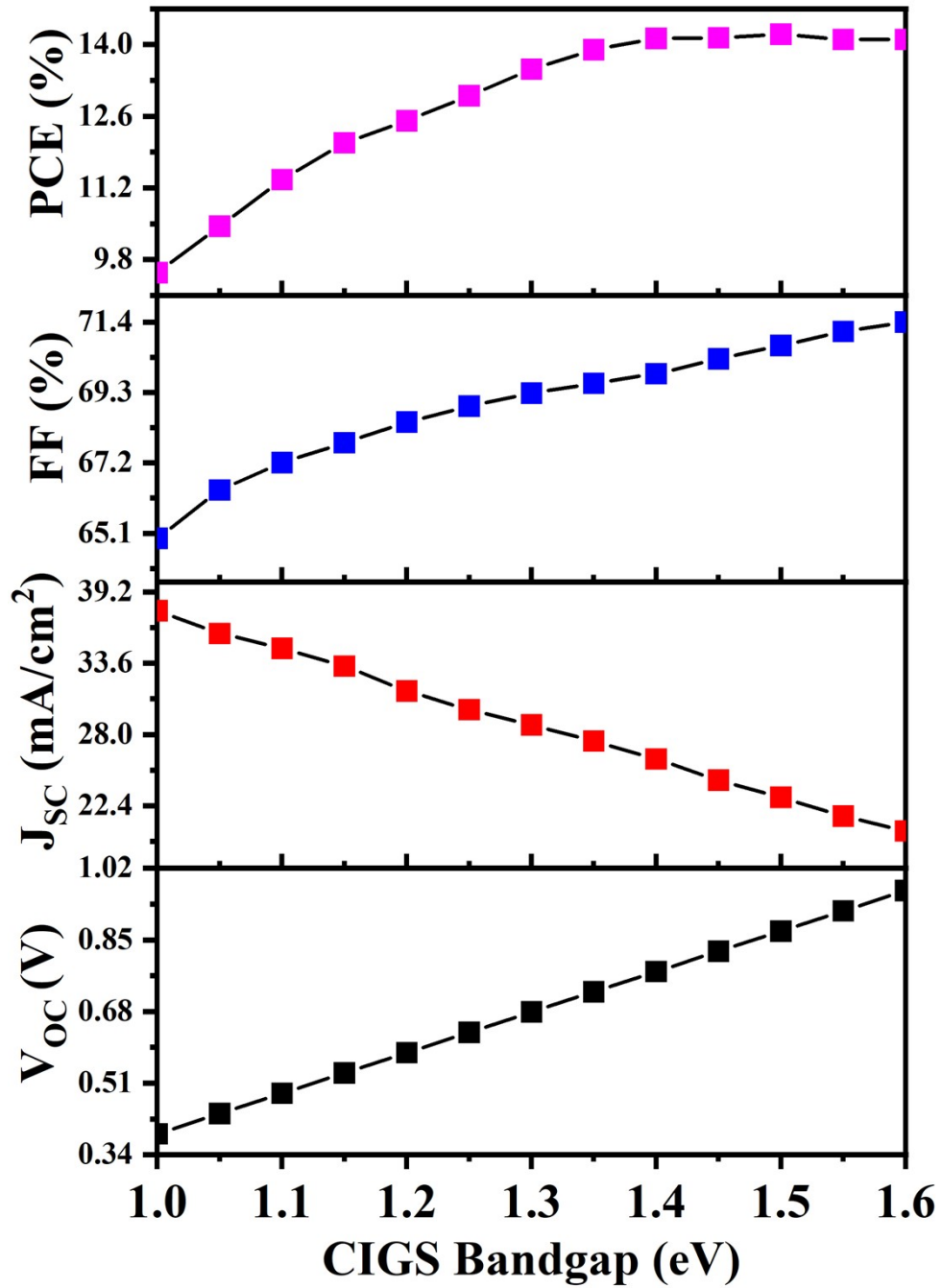


Fig. S-5 Effect of CIGS bandgaps on the V_{oc} , J_{sc} , FF, and PCE of the p-CIGS/n-GaSe heterojunction bottom cell.