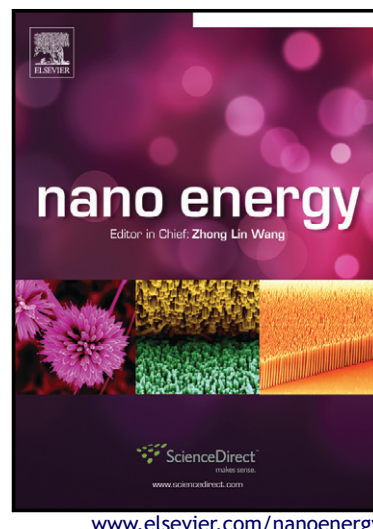


18.5% Efficient graphene/GaAs van der Waals heterostructure solar cell

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18.5% efficient graphene/GaAs van der Waals heterostructure solar cell

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Abstract: High efficient solar cell is highly demanded for sustainable development of human society, leading to the cutting-edge research on various types of solar cells. The physical picture of graphene/semiconductor van der Waals Schottky diode is unique as Fermi level of graphene can be tuned by gate structure relatively independent of semiconductor substrate. However, the reported gated graphene/semiconductor heterostructure has power conversion efficiency (*PCE*) normally less than 10%. Herein, utilizing a designed graphene-dielectric-graphene gating structure for graphene/GaAs heterojunction, we have achieved solar cell with *PCE* of 18.5% and open circuit voltage of 0.96 V. Drift-diffusion simulation results agree well with the experimental data and predict this device structure can work with a *PCE* above 23.8%. This research opens a door of high efficient solar cell utilizing the graphene/semiconductor heterostructure.

KEYWORDS: Graphene; GaAs; van der Waals Schottky diode; solar cell

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