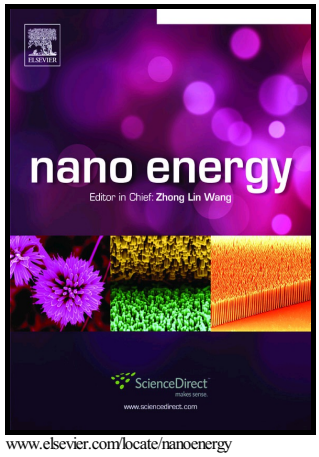

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Abstract:

Zero-dimensional graphene quantum dots (GQDs) have lately intrigued intensive interest because of their great promise in energy, optoelectronic, and bio-imaging applications. Herein, we demonstrated the fabrication of highly efficient GQDs/n-silicon heterojunction solar cells via a simple solution process. Owing to the unique band structure, the GQDs layer could not only serve as hole transport layer to facilitate the separation of photo-generated electron-hole pairs, but also act as electron blocking layer to suppress the carrier recombination at anode. Moreover, graphene was used as the transparent top electrode for the heterojunction solar cells, ensuring the efficient light absorption and carrier collection. By adjusting the sizes of GQDs and the thickness of GQDs layer, a power conversion efficiency (PCE) as high as 12.35% under AM 1.5 G irradiation was achieved, which