

Application of Graphene-Based Composites for Ion Migration Engineering for Efficient Stable Perovskite Solar Cells

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Herein, we suggested an approach to improve light stability and performance of PSCs via ion diffusion engineering to impede the destructive ions migration within perovskite phase. A combination of perovskite and silver doped reduced graphene oxide was used as hybrid composite light absorber layer to combine both concepts of hindering ion migration/diffusion and accelerate the charge transport within perovskite layer. To stimulate ion migration in perovskite, thermal annealing of solar cells was performed at 90 oC under dark and Ar environment for 90 h. Performance of as-fabricated solar cells with the rGO composite was stable with maintaining about 90% of their initial values, while the performance of pristine perovskite cells dropped to 39% of initial values due to degradation. This approach presents a higher capability in light/heat tolerance of perovskite phase without any extra effort and the major credit goes to the rGO-based composite. Apart from diffusion barrier, our results indicate the Ag-rGO composite enhanced the charge separation and suppressed the charge recombination, which is consistent with the corresponding device performance.