Surface plasmon assisted electron-hole migration for high photocurrent density generation in perovskite solar cell

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ABSTRACT

Zinc oxide (ZnO) has been used widely as a selective electron collector owing to its superior characteristics of high electron mobility and low temperature processability, especially in a perovskite solar cell (PSC). However, the obtainment of a large photocurrent density within ZnO based PSC is still a great task due to its high electron-hole recombination. Herein, we demonstrated an enhancement in the efficiency of PSC using high quality gold (Au) decorated ZnO nanorods in the absence of hole transporting material (HTM). The integration of Au nanoparticles into the photoanode increased the efficiency of light harvesting as well as electron-hole separation, reduced the electron-hole recombination rate significantly, and accelerated the carrier charge transfer. This study yields a promising outlook for high photocurrent density generation by the sole virtue of plasmonic integration into fabricated photoanode to significantly improve the conversion efficiency of PSC.

KEYWORDS

ZnO; Plasmonic metal; Perovskite; Electron−hole recombination; Schottky barrier

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