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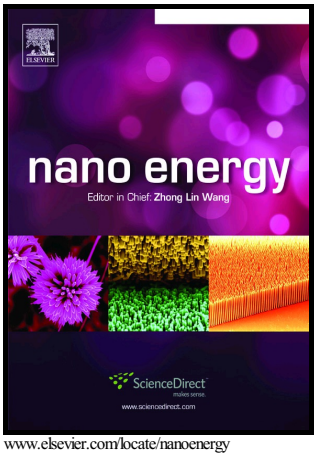

www.elsevier.com/locate/nanoenergy

PII: S2211-2855(18)30480-4
DOI: https://doi.org/10.1016/j.nanoen.2018.06.085
Reference: NANOEN2866

To appear in: *Nano Energy*

Received date: 23 May 2018
Revised date: 27 June 2018
Accepted date: 29 June 2018

Cite this article as: Yang Wang, Mingzhu Li, Xue Zhou, Pengwei Li, Xiaotian Hu and Yanlin Song, High Efficient Perovskite Whispering-Gallery Solar Cells, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.06.085

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Keywords: Light trapping, Whispering-Gallery, Imprinting, Perovskite

Abstract: Inspired by light/sound trapping in whispering-gallery, a light trapping structure mimicking whispering-gallery (WG) structure is constructed on perovskite active layer for antireflection and light harvesting via simply imprinted process with robust microstructure stamp for perovskite solar cells (PSCs). The WG structured perovskite films can achieve light trapping by optical feedback and gradually absorption. The crystallization and size of perovskite are improved by the imprinting process with robust micro-patterned stamp. Moreover, this method can efficiently accelerate electron-hole separation and suppress recombination by extract tentacles of the arrayed column structure. Consequently, the power conversion efficiency of the whispering-gallery structured PSC is improved to 19.80%, which is ca. 29.4 % higher than that of the non-imprinted PSC (15.30%).

Graphical Abstract

Inspired from whispering-gallery mode, whispering-gallery structure for light trapping is constructed on perovskite active layer via simply imprinted process to improve the optical feedback and gradually absorb the reflected light. This process can improve the crystallization and size, achieve light trapping for light harvesting and accelerate electron-hole separation. Consequently, the photovoltaic response is dramatically improved by surface-imprinted process in PSCs, leading to power conversion efficiencies of 19.80%.