

# Fabrication of hybrid perovskite solar cells based on low temperature solution process

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## ABSTRACT

Organic–inorganic perovskite solar cells have recently emerged at the forefront of photovoltaics research due to its dual electron and hole mobility. Organo-metal halide perovskites were composed of an ABX<sub>3</sub> (e.g. CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub>) structure in which A represents a cation, B a divalent metal cation (e.g. Pb<sup>2+</sup>) and X a halide (e.g. F, Cl, Br, I). We used two different materials such titanium dioxide (TiO<sub>2</sub>) as the perovskite electron transport layer of the solar cell in this study. The titanium dioxide colloid was prepared by using a ball-milling process with the 50 micrometer zirconia balls in a SiC pot for 8~10h. Then, the titanium dioxide powders were prepared after annealing. The effects of annealing temperature on the properties of perovskite thin film were also investigated. The organic–inorganic perovskite solar cells with structure ITO/TiO<sub>2</sub>/Perovskite/Spiro-OMeTAD/Ag were fabricated. The best performance of the prepared solar cells had a photo conversion efficiency of 6.4%, J<sub>sc</sub> of 12.11 mA/cm<sup>2</sup>, V<sub>oc</sub> of 0.96V, and fill factor of 0.56, respectively.

**Keywords:** Solar cell, Perovskite, Titanium dioxide, electron transport layer