

Organo-Lead Halide Perovskite Solar Cells on Inorganic Materials (CuSCN, NiO, SnO₂, and c-Si)

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Organo-lead halide perovskites have attracted much attention for solar cell applications due to their unique optical and electrical properties. With either low-temperature solution processing or vacuum evaporation, the overall conversion efficiencies of perovskite solar cells with organic hole-transporting material were quickly improved to over 15% during the last 3 years. However, the organic hole-transporting materials used are normally quite expensive due to complicated synthetic procedure or high-purity requirement. Here, we demonstrate the application of an effective and cheap inorganic p-type hole-transporting material, copper thiocyanate, on lead halide perovskite-based devices. With low-temperature solution-process deposition method, a power conversion efficiency of 12% was achieved under full sun illumination. This work represents a well-defined cell configuration with optimized perovskite morphology by two times of lead iodide deposition, and opens the door for integration of a class of abundant and inexpensive material for photovoltaic application. Moreover, recent progress of inorganic solar cells in our lab will be presented.