

Transitional Metal doping effect on Nickel Oxide as Hole Transport Layer for Perovskite Solar Cell Application

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Nickel oxide (NiO) has proven to be an attractive material in solar energy application as a hole transport layer (HTL) in perovskite solar cells. One of the key issues in improving solar cell performance is increasing the conductivity of NiO. Low conductivity results increased recombination and reduced hole extraction. The conductivity can be improved by doping on NiO, especially transitional metal as a dopant. Transitional metals such as Copper (Cu), Silver (Ag), Cobalt (Co), Vanadium (V) and Yttrium (Y) has favorable ionic radius with nickel atom and easily substitutes nickel atom by transitional metal. Besides that the transitional metal dopant helps to shift valence band of NiO and favored to the HOMO level of the perovskite material. In this work, V doped NiO colloidal QDs synthesized by the reduction of nickel (II) acetylacetonate and vanadium pentoxide with the borane-triethylamine complex in a mixture of oleylamine. Both pristine and V doped NiO colloidal particles used to fabricated solar cell. The photovoltaic property of fabricated p-i-n and n-i-p perovskite solar cells measured under solar simulator.