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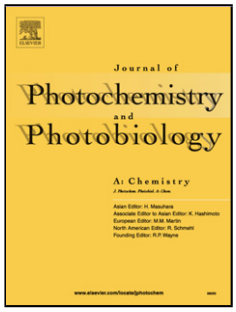

Title: Probing the influence of lithium cation as electrolyte additive for the improved performance of p-type aqueous dye sensitized solar cells

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ACCEPTED MANUSCRIPT

Probing the influence of lithium cation as electrolyte additive for the improved performance of p-type aqueous dye sensitized solar cells

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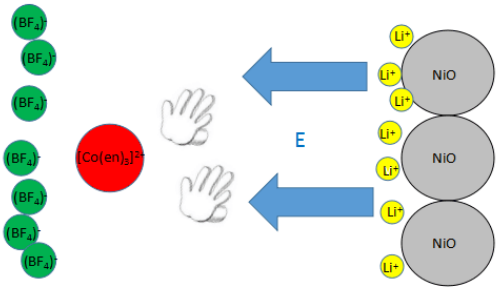
Graphical Abstract

Table of Content

The addition of lithium in the aqueous electrolyte can effectively prohibit the charge recombination without sacrificing the driving force for charge injection for p-type dye-sensitized solar cells.



Highlights

- The addition of lithium ion into aqueous electrolyte can efficiently prohibit charge recombination
- P1 sensitizer based p-type dye-sensitized solar cells demonstrate good energy conversion efficiency

Abstract: NiO based p-type aqueous dye-sensitized solar cells (p-DSCs) with various lithium ion concentrations in electrolytes have been studied using a series of techniques. The existence of lithium ion can form an inside electric field near the NiO working electrode surface and restrain the charge recombination, as is demonstrated by the electrochemical impedance spectroscopy measurement. The narrowing of driving force after the addition of lithium ion does not affect the efficient charge injection, while the widened energetic difference between the valance band of NiO and the redox potential of the electrolyte contributes to the improvement of photovoltage. As a result, the optimal concentration of lithium ion is found to be 1.35 M and the corresponding average power conversion efficiency of P1-dye-sensitized aqueous p-DSCs is 0.40% (measured under standard AM 1.5 G test conditions), which almost doubles that without lithium ion addition. The results suggest a very facile method for the improvement of the photovoltaic performance of p-type aqueous DSCs.

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