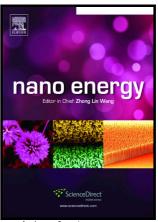
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Large improvement of device performance by a synergistic effect of photovoltaics and thermoelectrics

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Large improvement of device performance by a synergistic

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Abstract: In this paper, a hybrid generator has been fabricated by connecting a dye

sensitized solar cell (DSSC) with a single p-n junction thermoelectric generator (TEG)

in series. Both the open-circuit voltage and the short circuit current of the hybrid

generator have been enhanced obviously in comparison with the algebraic sum of

those of the DSSC and TEG. The increase of non-equilibrium carrier concentration

originates from the synergistic effect between the TEG and DSSC, which lifts the

quasi-Fermi energy level and improve the photoelectric response rate thus enhancing

the open-circuit voltage and current density of the DSSC. As a result, a conversion

efficiency of 9.08% has been obtained in hybrid B, which is greatly enhanced by

20.6% and 725.5% in comparison with that of the separate DSSC and TEG,

respectively.

Keywords: synergistic effect; thermoelectric; photovoltaic;

1. Introduction

The ever-growing energy demand and environment pollution all around the world are

booming the R&D of clean and recoverable energy [1, 2], among which solar cells

have always been in the central stage and attracting more and more attention in recent

years. Up to now, solar cells have already evolved from the first generation silicon

based solar cells to the third generation i.e. sensitized solar cells, and many

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