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# Investigation of the role of Mn dopant in CdS quantum dot sensitized solar cell

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## **Abstract:**

Mn-doping into CdS quantum dots (QDs) has been demonstrated a useful way to enhance the power conversion efficiency (PCE) of quantum dot sensitized solar cells (QDSCs), the detailed systematic study is needed to get a better fundamental understanding. This work focuses on the study of the effects of Mn dopant on light harvesting, charge transfer, and charge collection of the solar cells. The results indicate that the Mn-doping into CdS QDs increases the light absorbance and extends the light absorption range, which results in the enhancement of the photo-generated current density. In addition, both the electron transport rate and the electron diffusion length are also increased with the introduction of Mn dopant. So the charge collection efficiency ( $\eta_{cc}$ ) of the solar cell increases from 89.9% for CdS sample to 96.7% for Mn/CdS sample. As a result, the PCE of Mn/CdS QDSC reaches 3.29%, which is much higher than that of CdS QDSC (2.01%).

*Key words:* CdS; quantum dot sensitized solar cells; Mn; efficiency

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