

Progress on the Third Generation Photovoltaic Devices (Invited Presentation)

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Abstract: We think that the current classification of solar cells is not reasonable. We suggest that the first generations should be defined as element (silicon) solar cells, including monocrystalline, multicrystalline, microcrystalline, nanocrystalline, amorphous Si cells; the second generations should be defined as compound solar cells, including CdTe, CIGS, GaAs, CZTSSe cells, etc; the third generations should be hybrid (composite) solar cells, including dye-sensitized cells, perovskite cells, organic cells, quantum dot cells, etc. As two typical examples, perovskite solar cells and dye-sensitized solar cells are introduced.

Dye-sensitized solar cell (DSSC) have become one of the typical representatives of the third generation solar cells owing to its low cost, easy preparation, high efficiency and environment benignity. Focusing on the PV technology golden triangle issues: efficiency, cost and stability, the scientists have devoted a great deal of endeavor since 1991. Ten important processes of DSSCs are introduced and emphasized.

Lead halide amine perovskite solar cells (PSCs) have been dominant photovoltaic research topic in this decade owing to their low cost, easy preparation, and higher efficiency compared with other photovoltaic devices, as well as their unique features of perovskite. The PSCs have obtained a great progress with power conversion efficiency (PCE) of 3.8% in 2009 to more than 22% at present, and become the research hotspots of the third generation solar cells. Ten important processes of PSCs are introduced and emphasized.

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