It has been observed that for operating centrifugal pump against higher discharge pressure, the level of irradiance required is quite high to achieve its specific speed for delivering the water and therefore knowing the operating pressure this problem may be minimized by using energy storage devices like battery or supercapacitor operated in parallel with the SPV module. This may help to acquire more solar energy for the water pumping operation. Here is the need to select a proper configuration of solar PV water pumping system (SPVWPS) using energy storage devices for economic application. Therefore in this present work, we optimize the battery- supercapacitor based SPVWPS for a discharge pressure and evaluate the performance parameters. Four different configurations of solar PV water pumping system (SPVWPS) using centrifugal pump are considered, namely, direct coupled, with battery, with the supercapacitor and with battery-supercapacitor hybrid and to determine the optimum configuration for higher system performance. The experiment have been carried out with a 2m static head with variable dynamic head of the pump on sunny days. The comparison of the performance for the different configurations have been evaluated.

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Numerical simulation of tin based perovskite solar cell: Effects of absorber parameters and hole transport materials

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The organometal perovskite solar cells have shown stupendous development and have reached power conversion efficiency (PCE) of 22.1 %. However, the toxicity of lead in perovskite solar cells is a major challenge towards their incorporation into photovoltaic devices and thus needs to be addressed. Tin perovskite ($CH_3NH_3SnI_3$) have attracted a lot of attention recently and could be a viable alternative material to replace lead perovskite in thin film solar cells. A detail understanding of effects of each component of a solar cell on its output performance is needed to further develop the technology. In this work, we performed a numerical simulation of a planar heterojunction tin based perovskite solar cell using SCAPS (Solar Cell Capacitance Simulator). Results revealed that thickness and defect density of the absorber material strongly influence the PCE of the device. Various types of hole transporting material (HTM) were compared and analysed to improve the performance of the solar cell. Parameters such as hole mobility and acceptor density of HTM also signified dependence on PCE of the device. These results indicate the possibility to design, fabricate and enhance the performance of tin based perovskite solar cells.