This work describes a modeling investigation of a working Dye-sensitized Solar Cells, including the contribution of ionic drift in the mass transport process of I−3/I− redox couple. We found that the effective built-in electric field profile inside the cell is influenced by the density and distribution of the electronic traps located below the conduction band edge of the TiO2. Although the value of electric field remains low compared to conventional p-n junction solar cells, our results support that the high concentration of ionic species composing the electrolyte prompts a drift current of ionic species, comparable to the related ionic diffusion current, when the device is exposed to light illumination under short-circuit conditions. The simulations carried out for different electrolyte compositions tend to demonstrate that ionic drift is a process which can never been suppressed and therefore should be considered in the description of the mass transport. These results participate in the better understanding of the working principle of the complex and multifaceted chemistry of dye-sensitized solar cells.

Stichworte: Dye Solar Cells ionic additives photovoltaic simulation


Jahr: