Improved photovoltaic performances of dye-sensitized solar cells by reducing charge recombination rate at polymer gel electrolyte and photoanode interface

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There has been much attention towards dye-sensitized solar cells (DSSCs) for the past decades due to their attractive features such as high energy conversion efficiency and low production cost etc. Recently, cobalt complexes have been suggested as one of the most promising candidates for replacing conventional iodine redox couples owing to their high voltage characteristics. Even though respectable energy efficiency exceeding 12% was reported by employing liquid electrolyte that consists of cobalt complex redox mediator and volatile solvent, the use of volatile liquid solvent cannot ensure the long-term stability of DSSCs. In this work, therefore, novel polymer gel electrolytes (PGEs) including cobalt complexes as redox couples have been prepared for efficient and long-term stable DSSCs. In addition, several ways to mitigate the charge recombination rate at the interface between PGE and photoanode have been systematically investigated. This work was supported by a grant (RE201702218) from the Environmental Industry Advancement Technology Development Project of Korea Environmental Industry & Technology (KEITI) funded by Korea Ministry of Environment (MOE).