Enhanced device performance of mesoscopic hybrid perovskite solar cells by using Li-treated TiO_2 electrode

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Recently, organic-inorganic hybrid perovskite solar cells have been intensively studied because they can attain high efficiency and reduce processing cost due to all solution processibility. Although the hybrid perovskite solar cells have attractive properties, they were suffered from hysteresis problem with respect to scan direction and rate by charge accumulation or dielectric polarization. Therefor it is important issue to reduce the hysteresis of J-V curves in hybrid perovskite solar cells in order to enhance the device efficiency. Here, we tried to reduce the hysteresis of J-V curves in mesoscopic hybrid perovskite solar cells by using Li-treated mesoscopic TiO_2 electrode because it is expected that the Li-treated TiO_2 electrode has more favorable charge injection at mesoscopic TiO_2 electrode/perovskite interface than that at bare mesoscopic TiO_2 electrode/perovskite interface. Through the introduction of Li-treated mesoscopic TiO_2 electrode, we could attain over 17 % of power conversion efficiency under illumination of 1 sun (100 mW/cm^2 AM 1.5G) without hysteresis of J-V curves with respect to scan direction.