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Supporting Information:

![Graph](image)

**Fig. S1** Time-dependent normalized $J_{sc}$ of the DSC containing different Li⁺ cation concentration without additive such as MBI under one-sun conditions with the lapse of time after fabrication. The TiO₂ thickness was about 12 µm. The electrolytes were 0 M LiI (squares), 0.3 M LiI (triangles), 0.7 M LiI (upside-down triangles). The solvent was 3-Methoxypropionitrile (MePN), and I₂ (0.1 M) was dissolved for all the DSCs.

Fig. S1 showed the normalized $J_{sc}$ of DSC containing different Li⁺ cation concentration without additive such as MBI in the electrolyte during a long term accelerated aging tests under one sun light soaking. For DSCs without LiI and additive such as MBI, the $J_{sc}$ retaining about 120 % of its initial value after 120 h was mainly due to the fact that DMPI⁺ can penetrate into the dye-adsorbed layer and caused a positive shift of the TiO₂ conduction band edge to improve the electron injection yield and $J_{sc}$ in the light. When LiI was introduced into the DMPII electrolyte (as shown in Fig. S1), the normalized $J_{sc}$ of DSCs decreased obviously after 1000 h in comparison with DSCs without LiI and additive such
as MBI. This indicated that LiI in the electrolyte can penetrate into TiO$_2$ lattice for DSCs to decrease the electron injection yield and $J_{sc}$ under one sun light soaking.

**Fig. S2** Nyquist plots for DSCs with different electrolyte cations under one sun light soaking measured at forward bias of -0.67 V in the dark. The lines show the fitted results.
Figure S2 showed the Nyquist plots for DSCs employing different electrolyte cations with aging time for DSCs investigated by EIS measurements. The impedance data of Nyquist plots was tested at forward bias of -0.67 V in the dark, and the change in $R_{Ps}$, $R_{ct}$, $C_{\mu}$ and electron lifetime with different aging were obtained as shown in Figure 7. Through the analysis of the impedance data of Nyquist plots, the electron transport resistance in nano-TiO$_2$ film were found to decrease from 7.5 $\Omega$ to 0.5 $\Omega$ for DSCs with DMPI$^+$ (base electrolyte), decreased from 4.5 $\Omega$ to 1.8 $\Omega$ for DSCs with Cs$^+$ and slightly decreased from 3.0 $\Omega$ to 2.2 $\Omega$ for DSCs with Li$^+$ after 2100 h of aging test.
Action spectra of the monochromatic incident photon-to-current conversion efficiency (IPCE) of the DSCs were measured with a 300 W xenon lamp (Newport) and a monochromator (Model, Newport 74125, USA) as a function of excitation wavelength over the 350-800 nm spectral range. And the IPCE values for the long-term stability of DSCs were shown in Fig. S3. From Fig. S3, it was found the change in the ratio of IPCE/IPCE (fresh) under one sun light soaking (shown in Fig.9).