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Single-layer electrochromic device based on hydroxyalkyl viologens with large contrast and high coloration efficiency

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Abstract

Polymer gel electrolyte is defined as a combination of copolymer, suitable electrolyte and high boiling point solvents, demonstrating great potential in the fields of solid electrolytes in terms of good ionic conductivity, tunable mechanical properties and suitable viscosity. In this report, we successfully incorporated polymer gel electrolyte into electrochromic mixtures (consisting of hydroxyalkyl viologens and electron mediators hydroquinone (HQ) or ferrocene (Fc)) to fabricate single-layer all-in-one electrochromic devices (ECD). Although simplifying structure of the ECD, the device exhibited low driving voltages (0.9 V for Fc based ECD, 1.5 V for HQ based ECD), high optical contrast (up to 82%) and satisfactory coloration efficiency (>240 cm^2C^{-1}) as we expected. Flexible single-layer ECD based on ITO/PET was