

## Low Cost Quasi Solid State Electrochromic Devices Based On F-Doped Tin Oxide and TiO<sub>2</sub>

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### Abstract

In recent past, electrochromic devices (ECDs) have attracted much attention due to their potential applications as display devices with low power consumption and low cost. Expensive materials such as Tungsten oxide (WO<sub>3</sub>) and CeO<sub>2</sub> have been extensively studied in ECDs as working and counter electrodes, respectively. In the present study, we investigated the possibility of replacing expensive WO<sub>3</sub> and CeO<sub>2</sub> with low cost, transparent, and nano-crystalline, titanium dioxide (TiO<sub>2</sub>) as the electrochromic material and F-doped tin oxide (FTO) glass substrate as the counter electrode. A novel low cost electrochromic (EC) window device was fabricated by sandwiching a polymer electrolyte between mesoporous, nanocrystalline thin film of TiO<sub>2</sub> and FTO glass substrate. A quasi solid polymeric electrolyte composed of lithium chloride (LiCl), Ethylene Carbonate (EC), Propylene carbonate (PC) and Polyethylene Oxide (PEO) was employed as the electrolyte. ECDs with the configuration of FTO glass/TiO<sub>2</sub>/EC:PC: LiCl:PEO electrolyte / FTO glass were fabricated and their electrochromic properties were examined. A considerable reversible colour change between dark blue and colourless states was observed, when 2.5 V was applied repeatedly to the device. The device changes its transmission between 63% (bleached state) and 0.98% (coloured state) at the wavelength of 600 nm at 3.7 V.