

Succinonitrile Modified Polyacrylamide as a Quasi-Solid Electrolyte for an Organic Based Electrochromic Device

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Abstract : The interest in all solid electrochromic devices (ECD) is ongoing. This is because these devices offer realistic applications of electrochromic materials in products such as sensors, windows and energy storage devices. The use of quasi-solid (gel) electrolytes for the construction of these ECDs is attractive because of their ease of preparation, availability, low cost, improved electrochromic performance, good ionic conductivity and prevention of leakages in ECDs. Herein, we developed a gel electrolyte consisting of polyacrylamide modified with succinonitrile for an ECD containing leucine-modified naphthalene diimide (NDI-L) as electrochromic material. The amount of succinonitrile in the gel was optimized, and the structure, surface morphology, and ionic conductivity of the electrolytes were assessed using microscopic techniques and electrochemical methods. The ECD fabricated with the gel electrolyte displayed good electrochromic performance with a fast switching response of up to 10 s and outstanding stability. These results add significant insight into understanding the inter- and intra-molecular interaction in succinonitrile gel electrolytes and provide a typical practicable high-performance gel electrolyte material for solid electrochromic devices.

Keywords : electrochromic device, gel electrolytes, naphthalene diimide, succinonitrile

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