Exceptionally Durable Molecularly Defined Metal-Organic Electrochromic Materials and Devices.

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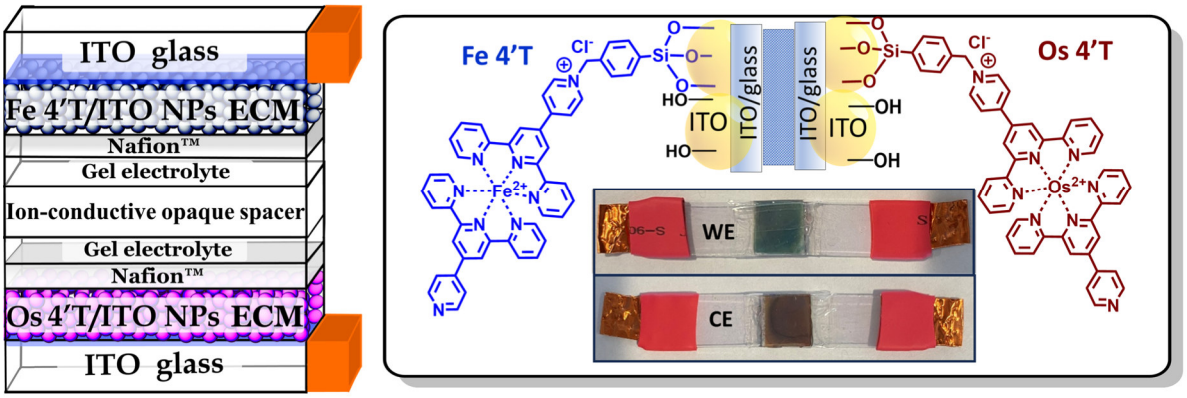
Abstract

Covalent attachment of the well-defined transition metal adducts of terpyridines into high surface area screen-printed electrodes is a powerful strategy to access durable electrochromic materials with great long-term durability, high colour contrast and fast switching speeds. Here we demonstrated how tuning of molecular structures in solution before the deposition or on-surface post-modification approach could be utilized to tune the colours of the electrochromic monolayers. In addition, we explored the energy storage potential of the hybrid electrochromic devices and explored the role of the counter electrodes on device degradation pathways. We studied the role of various components of the electrochromic devices in the overall stability of the devices and systematically optimized their performance in terms of operation potential window and long-term electrochemical durability; explored the nature of the processes on the interface between the electrochromic working electrode, gel electrolyte and counter electrode. Finally, we developed novel double-side device configurations that could operate in unilateral and bilateral modes and demonstrate unprecedented durability of 10^5 + electrochemical cycles.[1]



[1] DiPalo V-A; Ahmad R., Ebralidze, I. I.; Easton, E. B.; Zenkina, O. V., *ACS Appl. Mater. Interfaces, 2024, 16,* 1, 1082–1095