Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Data

Influence of ITO electrodes on the electrochromic performance outcomes of viologen-functionalized polyhedral oligomeric silsesquioxanes

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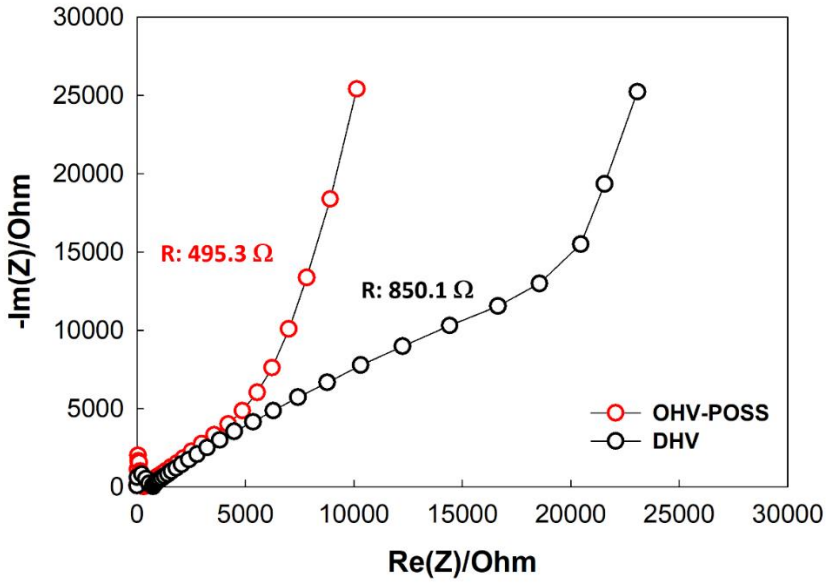

Figure S1. Impedance plots for measuring ionic conductivity of ion gel compositions made up of PVDF-HFP, [BMIM][BF_4] containing OHV-POSS and DHV.

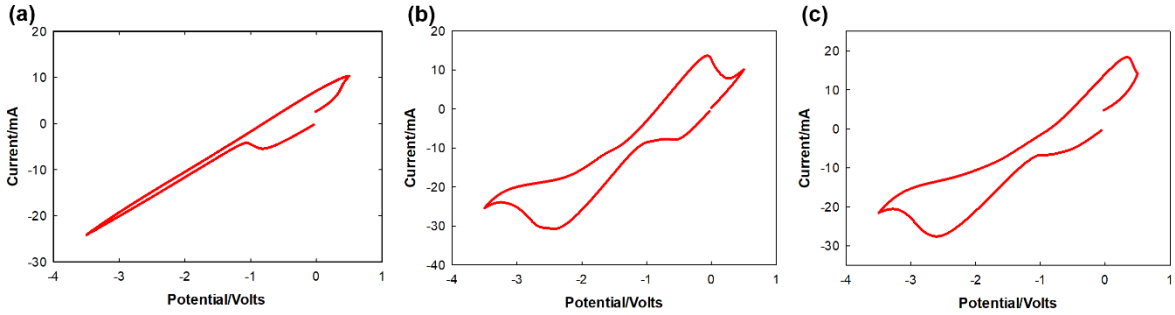

Figure S2. Cyclic voltammetry curves with scan rates 200 mV/s for [OHV-POSS][PF_6]$_{16}$ based ECDs with ITO-thickness (a) 68.5 nm (b) 140.3 nm, and (c) 252.1 nm.

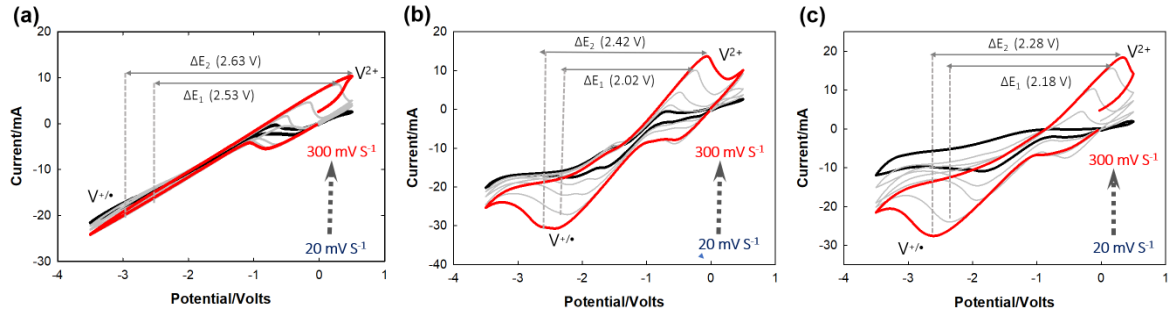

Figure S3. Cyclic voltammetry curves with different scan rates, 20, 50, 100, 200, and 300 mV/s for [OHV-POSS][PF_6]$_{16}$ based ECDs with ITO-thickness (a) 68.5 nm (b) 140.3 nm, and (c) 252.1 nm. ΔE represents the potential gap between viologen redox states i.e., dicationic and radical states (V^{2+}/ $V^{+\bullet}$). The thickness of the prepared ion gel film were 60 μm in ECDs.

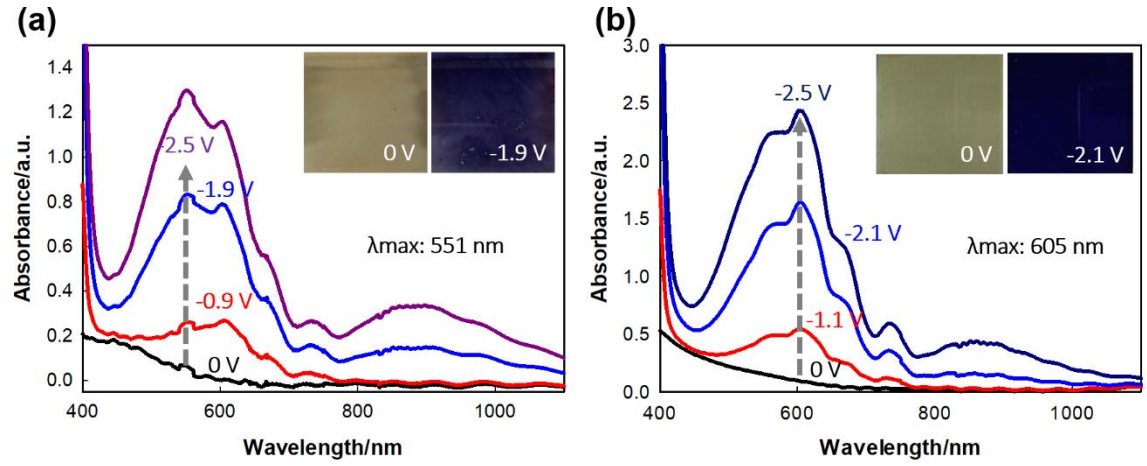

Figure S4. Spectroelectrochemical curves obtained with different applied potentials for (a) [OHV-POSS][PF_6]$_{16}$, and (b) [DHV][PF_6]$_2$ in [BMIM][BF_4] containing ion gel based ECDs prepared using electrode with ITO thickness of 252.1 nm.

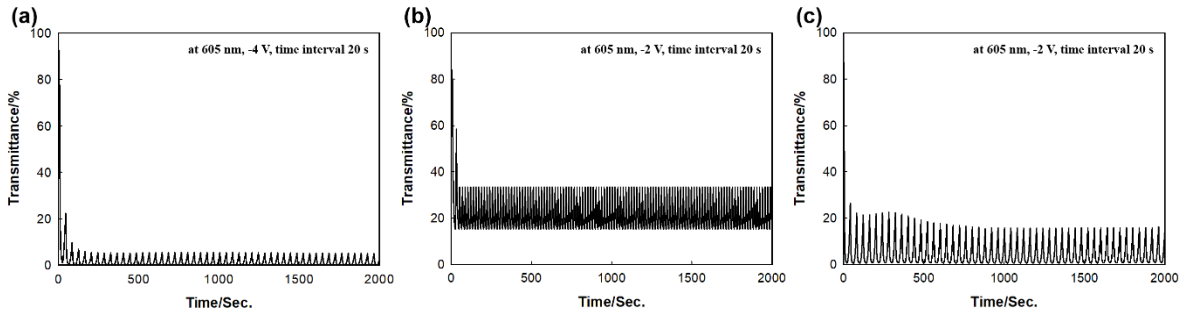

Figure S5. Kinetic stability of the electrochromic device (ECD) containing $[DHV][PF_6]_2$ at λmax 605 nm prepared with ITO-thickness (a) 68.5 nm, (b) 140.3 nm and (c) 252.1 nm, during constant potential stepping between (coloration) and short-circuit (bleaching).

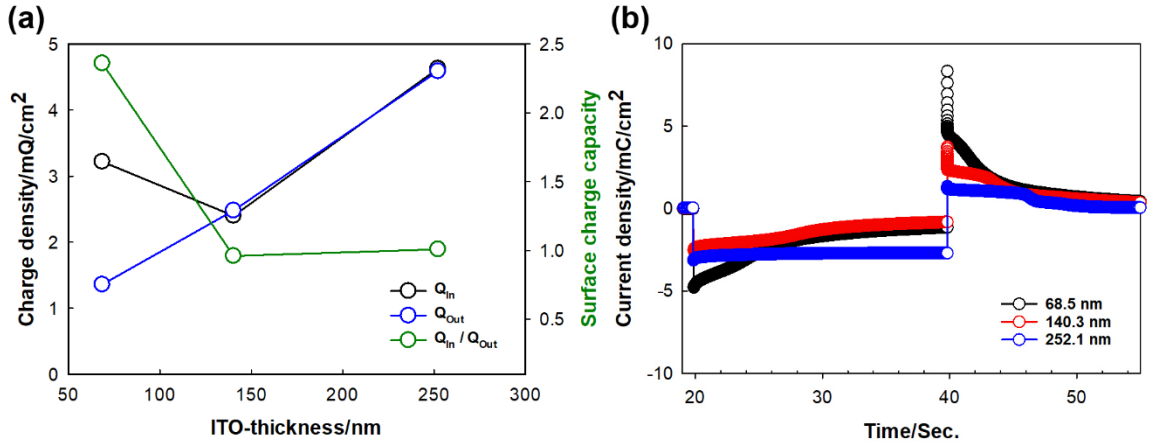

Figure S6. (a) ITO thickness dependant surface capacity for $[DHV][PF_6]_2$ based ECDs as a function of Q_{in} and Q_{out}. (b) Current density response of $[DHV][PF_6]_2$ based ECDs with ITO-thicknesses of 68.5 nm, 140.3 nm, and 252.1 nm. Corresponding current density responses for coloration and bleaching are shown in the inset.

Table S1. Ionic conductivity values of the prepared ion gel compositions.

Composition	Surface resistance (ohm)	Ionic conductivity (S/cm)
PVDF-HFP / [BMIM][BF_4] / OHV-POSS	495.3	6.24×10^{-3}
PVDF-HFP / [BMIM][BF_4] / DHV	850.1	3.63×10^{-3}