

Supplementary information

Mesomorphism and electrochemistry of thienoviologen bistriflimide liquid crystals

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Synthesis

Both thienoviologens, **8V(NTf₂)₂** and **12V(NTf₂)₂** were synthesized in a two steps synthetic procedure (Fig. S1). The first one involved the quaternization reaction of the 5,5'-bis(4-pyridyl)-2,2'-bithiophene **1** and iodododecane; while the second step involved a metathesis reaction between the iodide **mVI₂** and lithium triflimide in methanol.

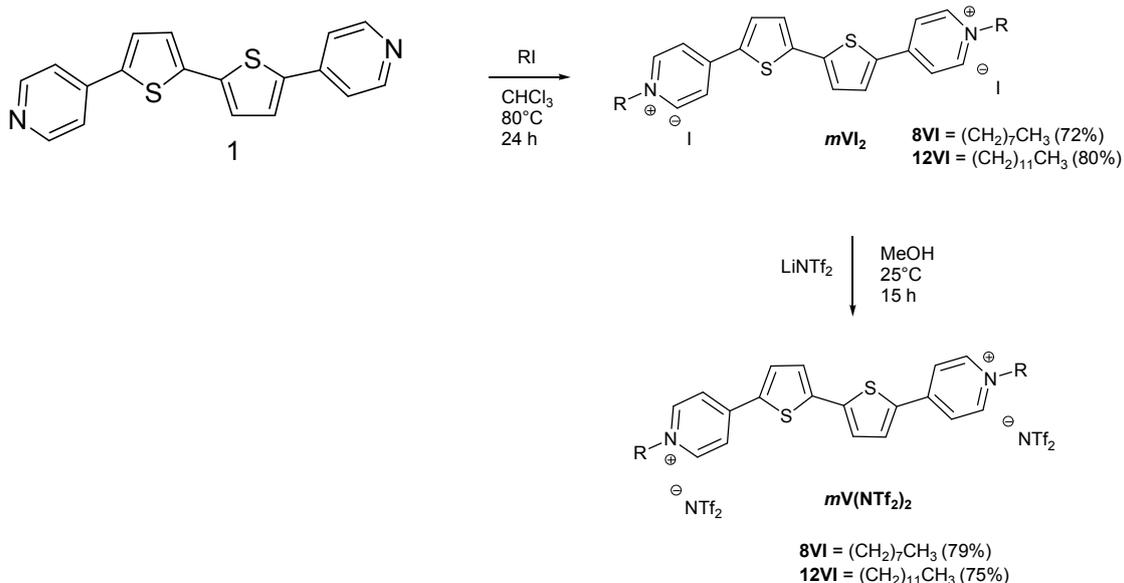


Fig. S1 Synthetic route to thienoviologen liquid crystals.

Thermal and structural analysis

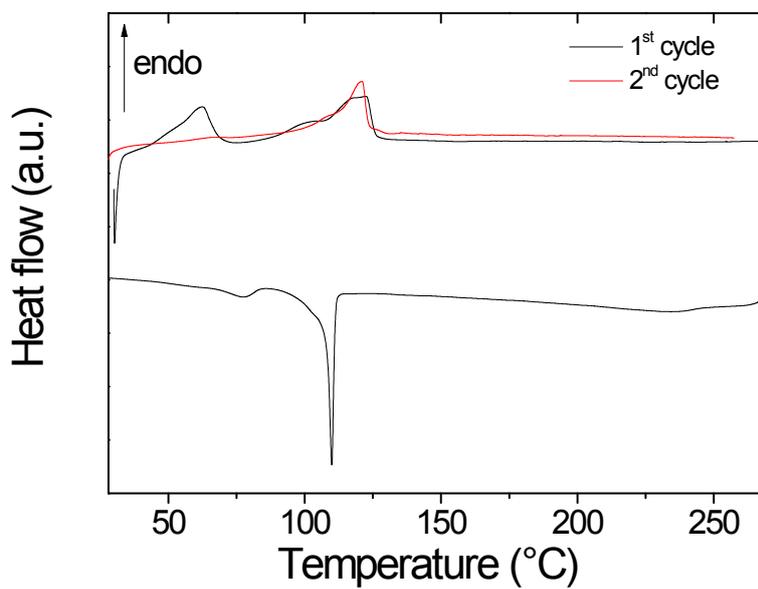


Fig. S2 DSC diagrams of $8V(NTf_2)_2$ for the 1st heating and cooling scan and 2nd heating at a rate of $10\text{ }^\circ\text{C min}^{-1}$.

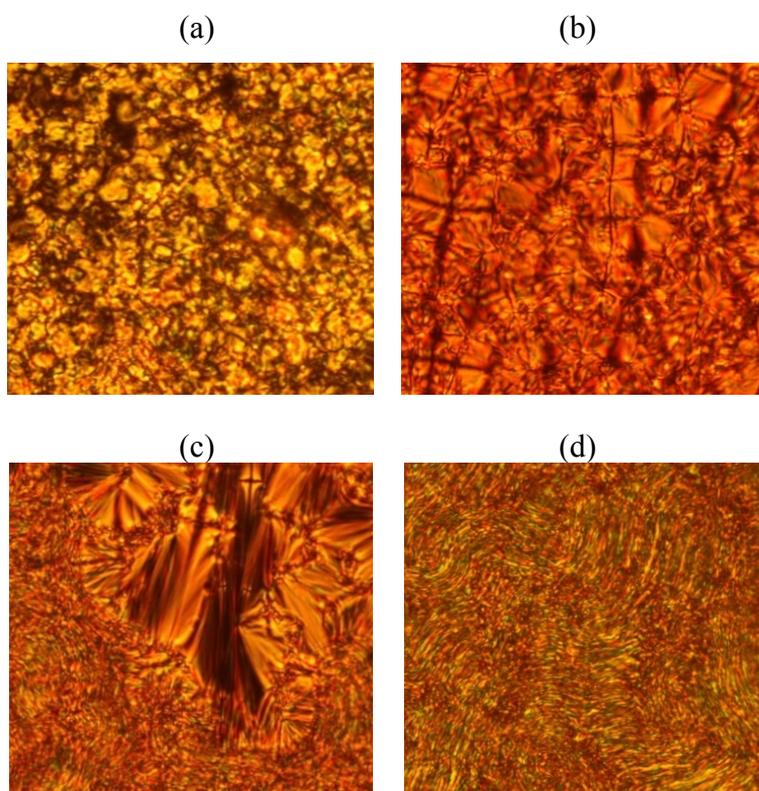
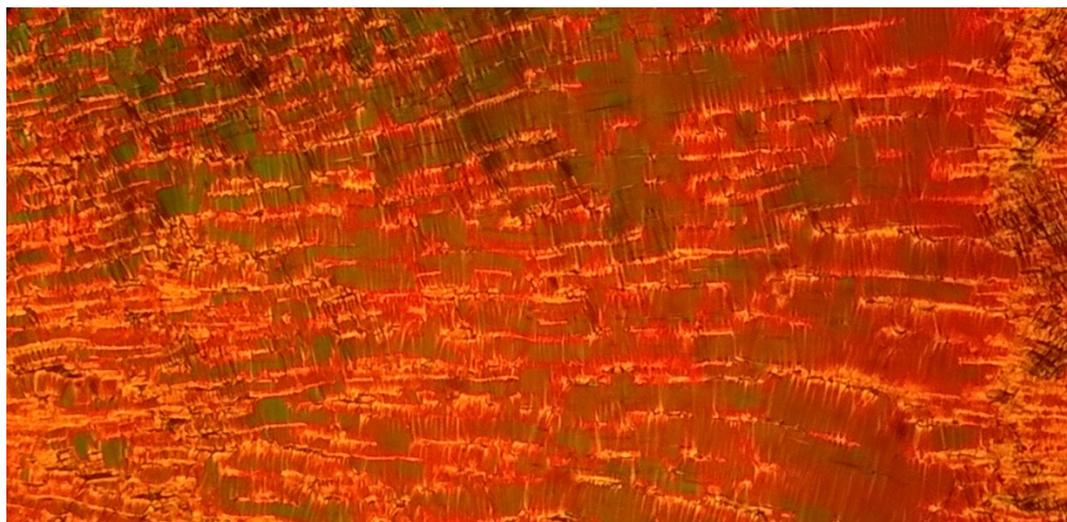
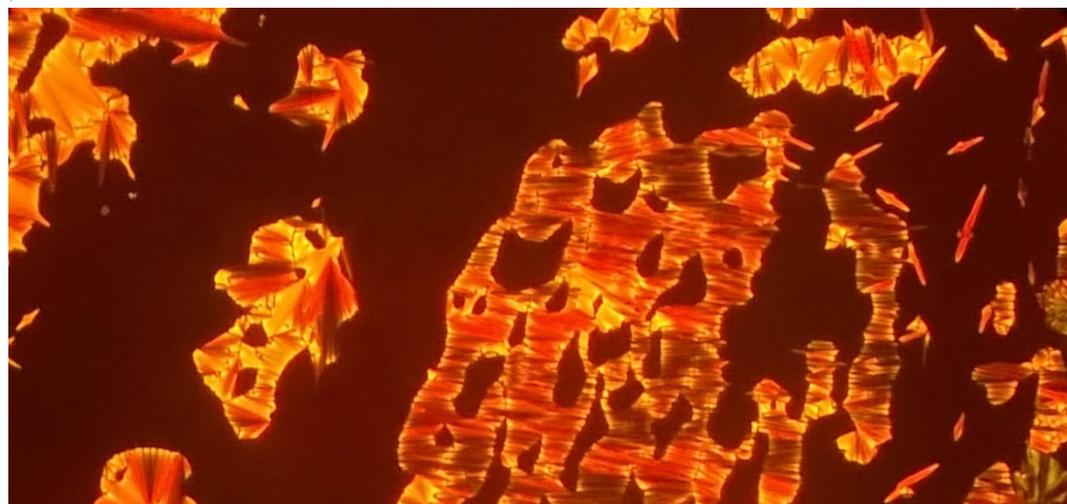


Fig. S3 Optical texture observed for $12V(NTf_2)_2$ in the 1st heating scan at (a) $166\text{ }^\circ\text{C}$, (b) $180\text{ }^\circ\text{C}$ and upon cooling from IL state at (c) $130\text{ }^\circ\text{C}$ and (d) $68\text{ }^\circ\text{C}$.

(a)



(b)



(c)



Fig. S4 Optical texture of a thin film of $12VI_2$ between two glass slides under cross polarized, at (a) 250 °C, (b) 240 °C and (c) 225 °C on cooling from the IL state.

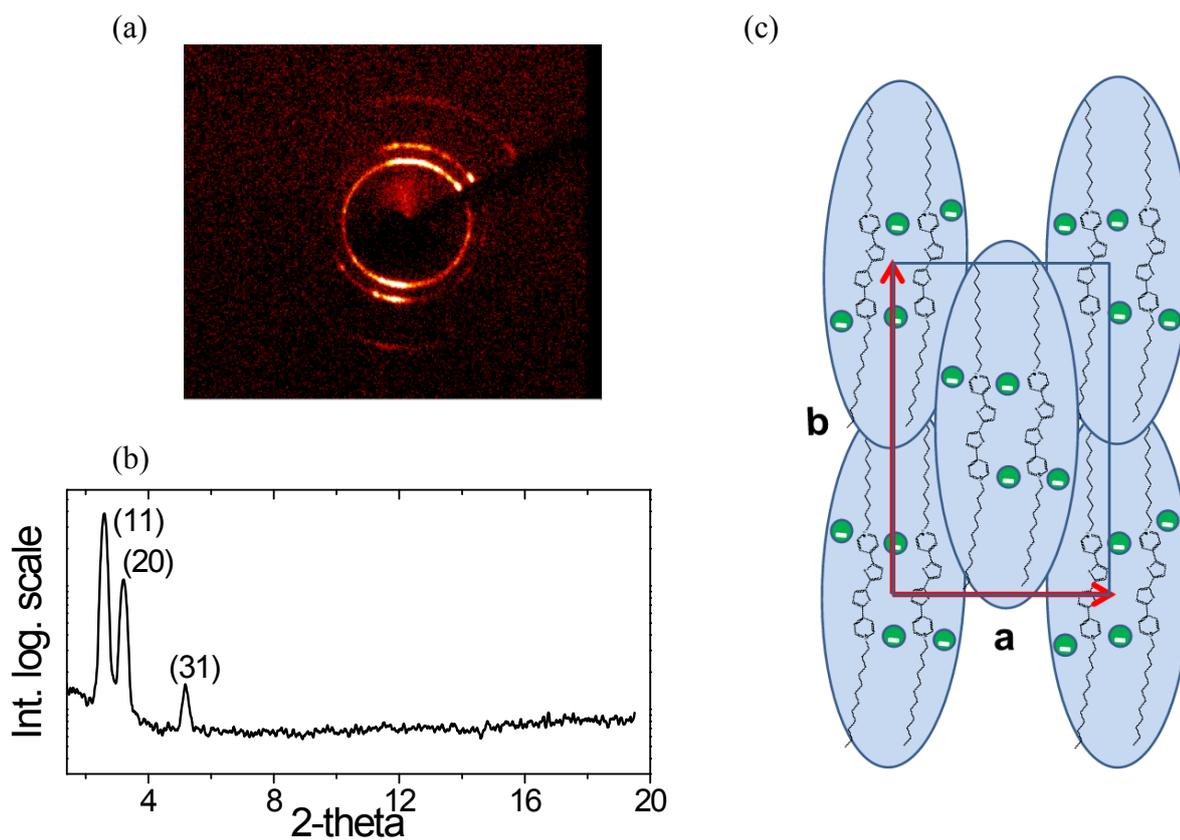


Fig. S5 (a) X-ray diffraction pattern of $12V(NTf_2)_2$, (b) its integration over the azimuthal angle recorded at 140 °C on the first heating scan and (c) schematic illustration of the $Col_r C2/m$ mesophase in which the disk are formed by dimerization of $12V(NTf_2)_2$ molecules.

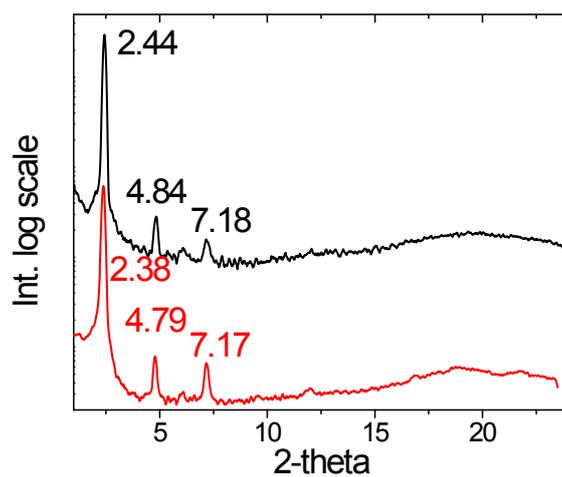


Fig. S6 XRD diagrams of $12VI_2$ recorded at 160 °C (red) and at 230 °C (black) on the 1st heating scan.

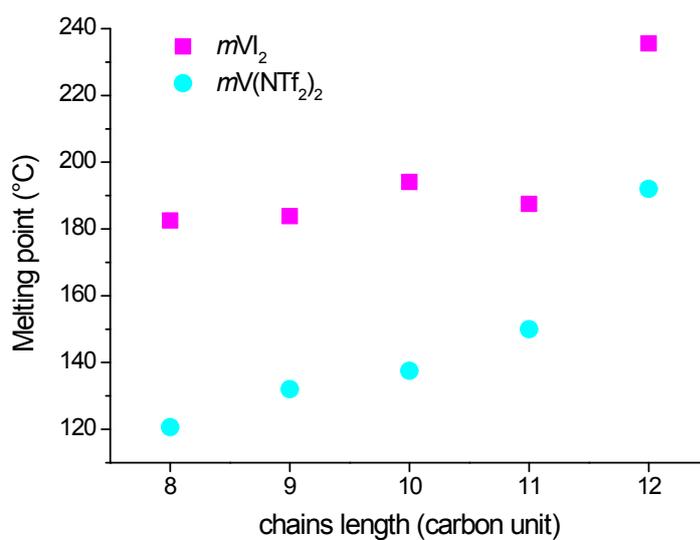


Fig. S7 Comparison between the melting points of the thienoviologen homologous series mVI_2 and $12VI_2$.

Electrochemistry

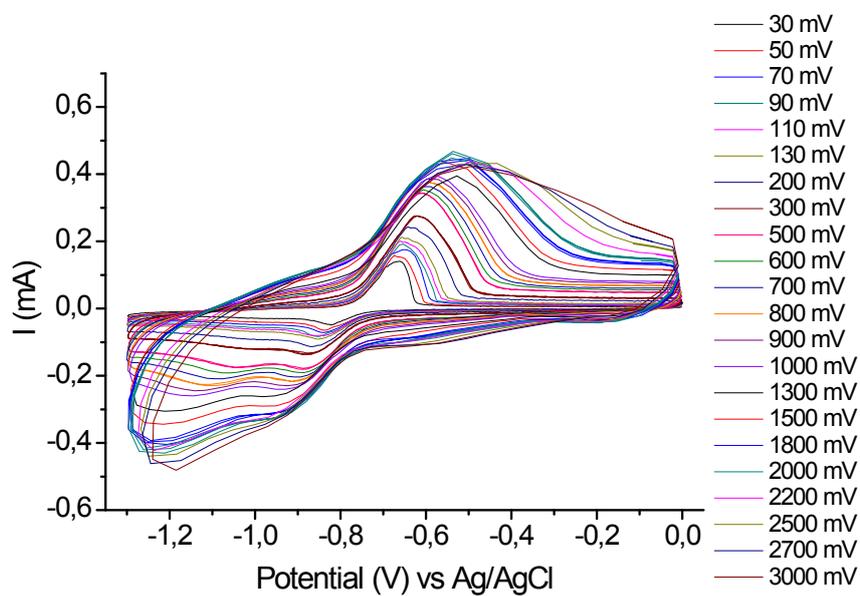


Fig. S8 Cyclic voltammograms at different scan rates of $12V(NTf_2)_2$ (0.5 mM) in electrolyte solution PC/0.1 M TBAPF₆.

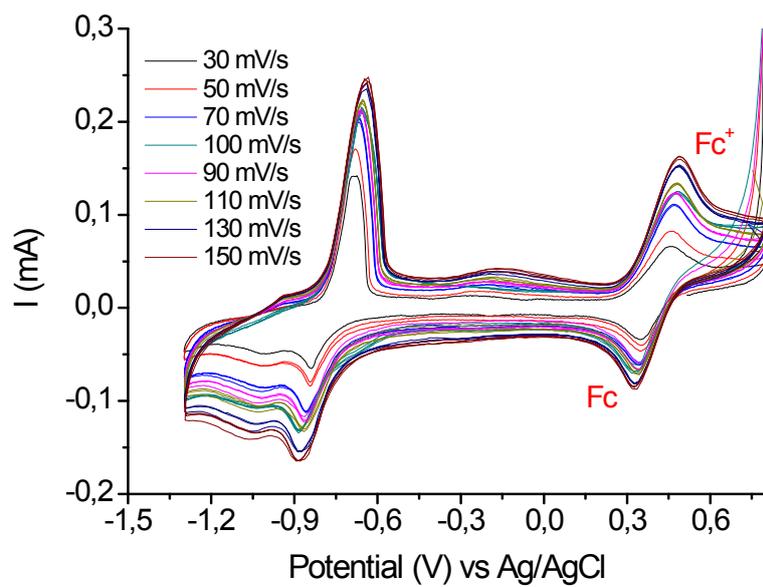


Fig. S9 Cyclic voltammograms at different scan rates of $12V(NTf_2)_2$ (0.5 mM) in PC/0.1 M TBAPF₆ containing also Fc⁺/Fc (0.5 mM).