Anisotropic Ionic Conductivity in Fluorinated Ionic Liquid Crystals Suitable for Optoelectronic Applications

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Supplementary Information

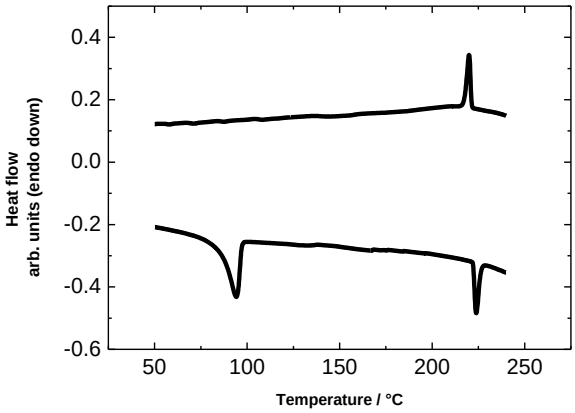
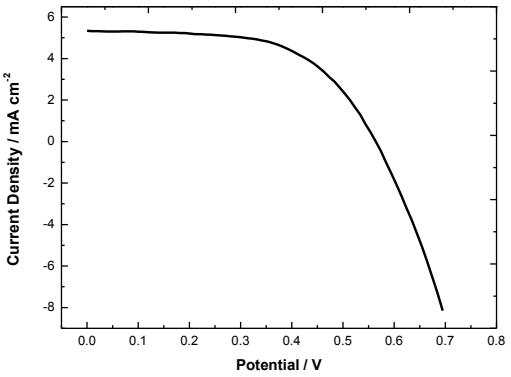


Figure S1. Differential scanning calorimetry trace of $R_{H\mathit{1}}ImC_2R_{\mathbf{F}\mathit{6}}$ showing that FILCs have a strong tendency to supercool on cooling. The same trend was observed for the other FILCs by heating-stage polarising optical microscopy.



V_{oc} (V)	J_{sc} (mA cm^{-2})	*FF*	η (%)
0.59	5.4	0.58	1.72

Figure S2: Photocurrent-voltage curve for a DSSC employing $R_{H\mathit{8}}ImC_3R_{\mathbf{F}\mathit{6}}$ as electrolyte, under standard illumination conditions (AM 1.5, 100 mW cm^{-2}). In the table below the figure, the device merit parameters: open circuit voltage (V_{oc}), short circuit current (J_{sc}), fill factor (FF) and efficiency (η).

Dye sensitized solar cell preparation: Prepared DSSCs consist of a conducting glass substrate (F-doped SnO_2) that was covered with a dense 500 nm TiO_2 layer, deposited by spray pyrolysis. On top of this layer, a nanoporous TiO_2 film was produced by doctor-blading a paste containing 50 nm anatase particles. After subsequent annealing to 250 °C a second layer of scattering TiO_2 film was formed containing 350/450 nm anatase particles. The resulting photoelectrodes of 15 µm thickness, were gradually heated up to 450 °C in air and subsequently sintered at that temperature for 10 min. The substrates were immersed in 0.04 M $TiCl_4$ solution for 30 min at 70 ºC followed by calcination at 450 °C for 30 min. When the temperature decreased to 40 ºC, the electrodes were immersed into a di-tetrabutylammonium *cis*-bis(isothiocyanato)bis(2,2′-bipyridyl-4,4′-dicarboxylato)ruthenium(II) (N719) dye solution (0.4 mM in acetonitrile and *tert*-butanol in volume ratio 1:1) for 16 hours. After the soaking of the dye solution, the electrodes were rinsed in acetonitrile. The devices were assembled with thermally platinized TCO as counter electrode, using a thermoplastic frame (Surlyn 25 µm thick). The prepared FILC electrolyte with iodine (0.25 eq), guanidinium thiocyanate (0.15 eq.) and *tert*-butylpiridine (0.8 eq.), was infiltrated by heating the prepared mixture at 70 ºC.

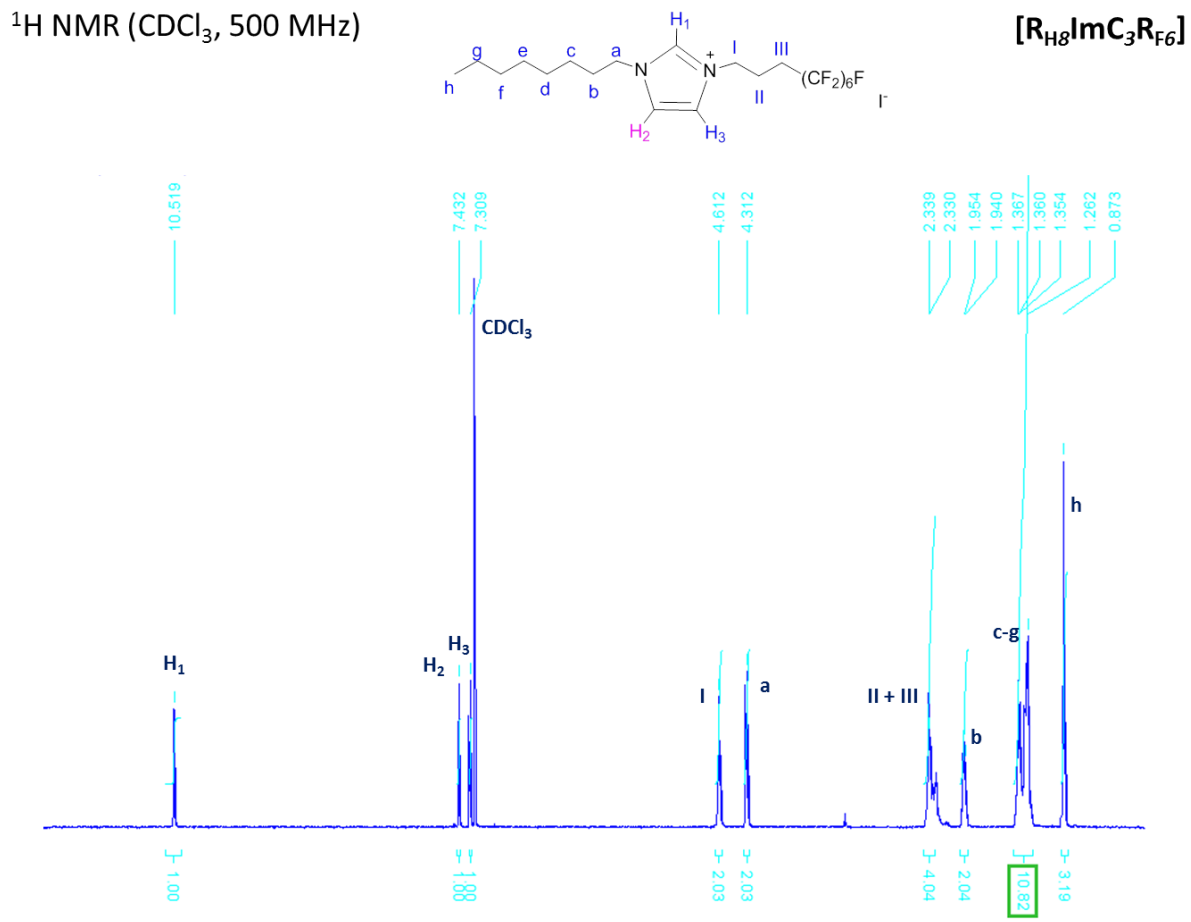


Figure S3: ^{1}H NMR spectrum of $R_{H8}ImC_3R_{F6}$.

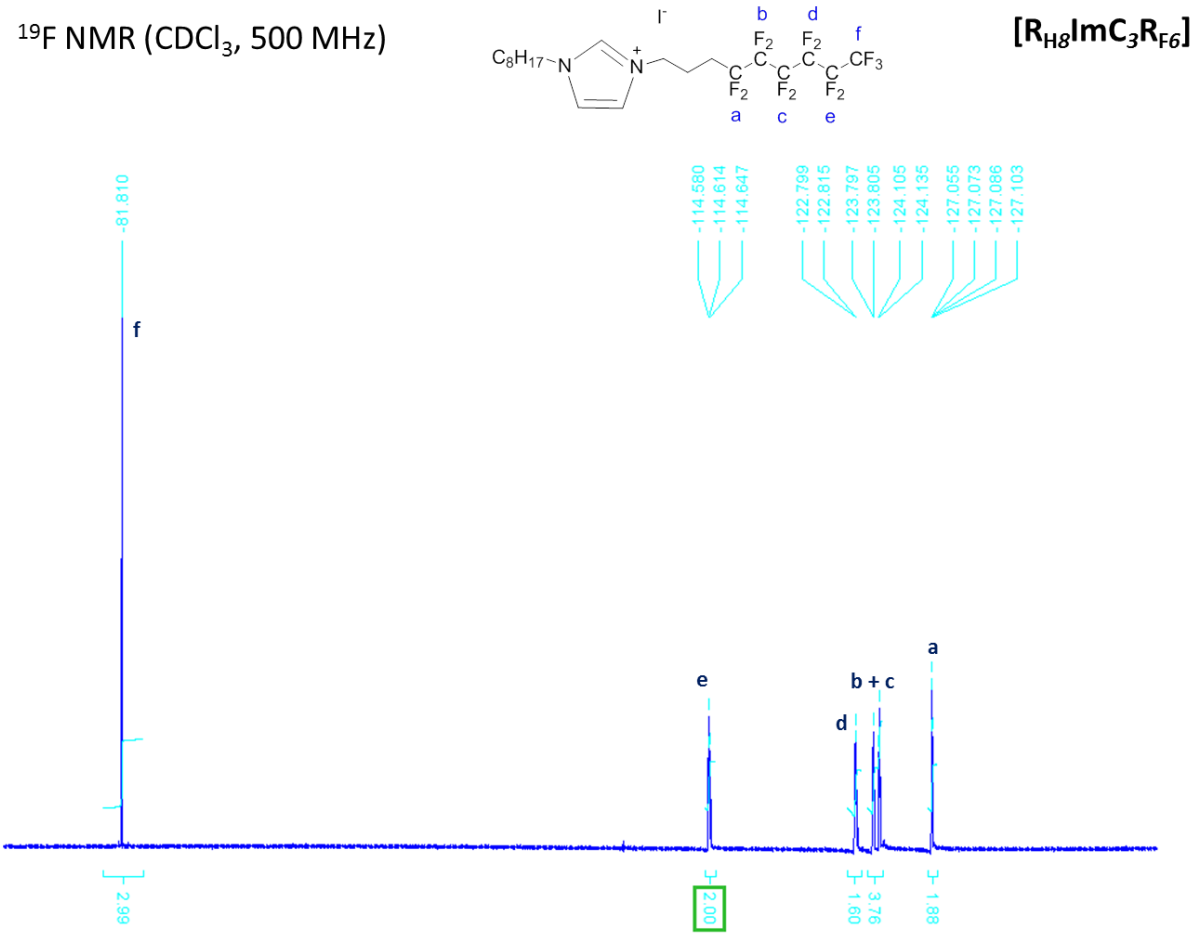


Figure S4: ^{19}F NMR spectrum of $R_{H8}ImC_3R_{F6}$.