Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Solder-Reflow Resistant Solid-State Micro-Supercapacitor based on Ionogels

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Fig. S1 Photography of a TMOS-DMDMS ionogel flexible membrane.

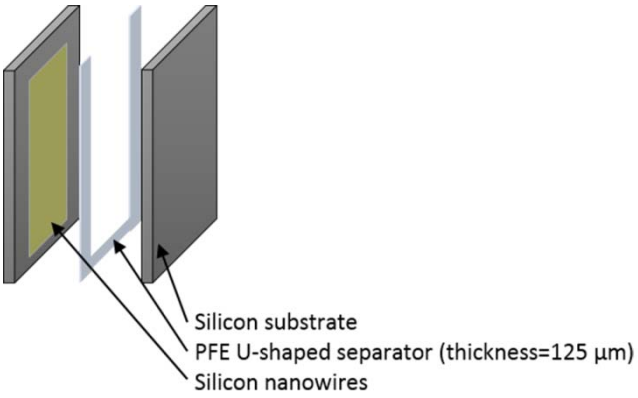

Fig. S2 Schematic representation of the µSC with a PFE mechanical separator to control the non-confined ionic liquid thickness between the two SiNW electrodes.

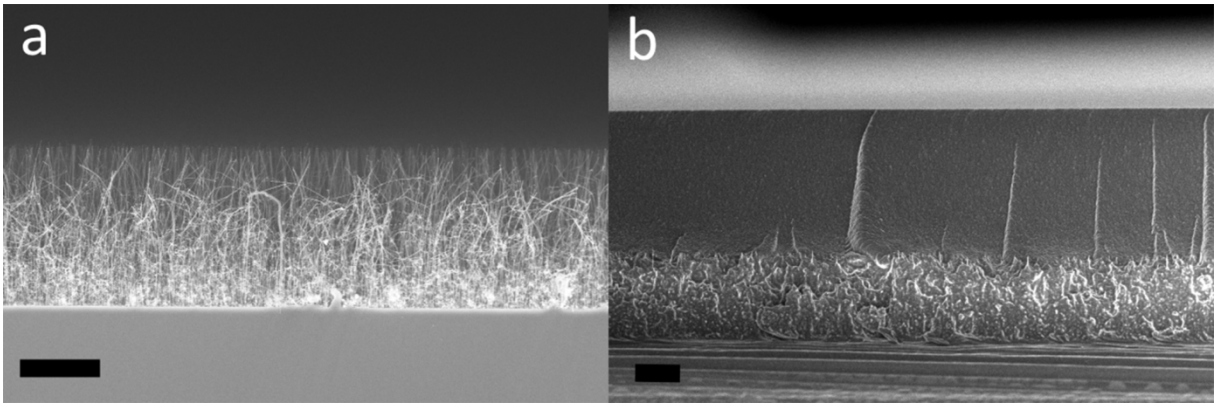

Fig. S3 SEM cross-section observation of 20 µm SiNWs without ionogel (a) and with [70/30]/33 ionogel (b) (scale bar=10 µm).

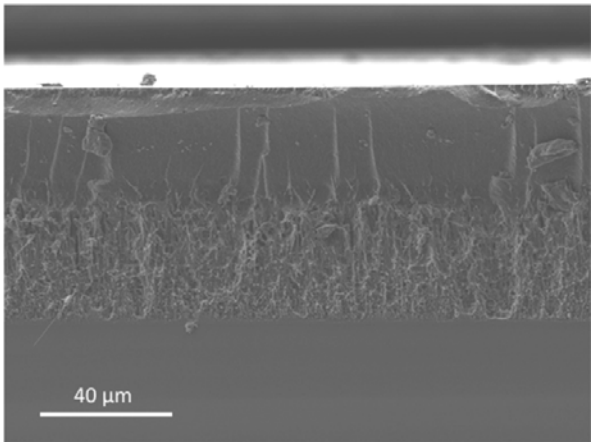

Fig. S4 SEM cross-section image of the zone used for EDX mapping of the ([70/30]/33 ionogel with the 40 µm SiNW electrode)

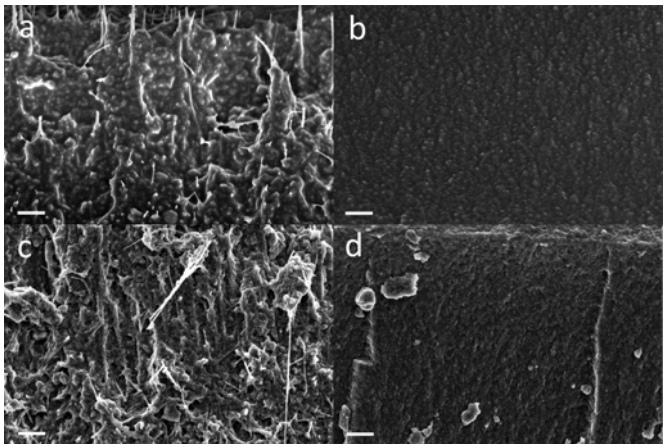

Fig. S5 SEM images of the [70/30]/33 ionogel within 20 µm SiNWs (a), above 20 µm SiNWs (b), within 40 µm SiNWs (c) and above 40 µm SiNWs (d) (scale bar=2 µm).

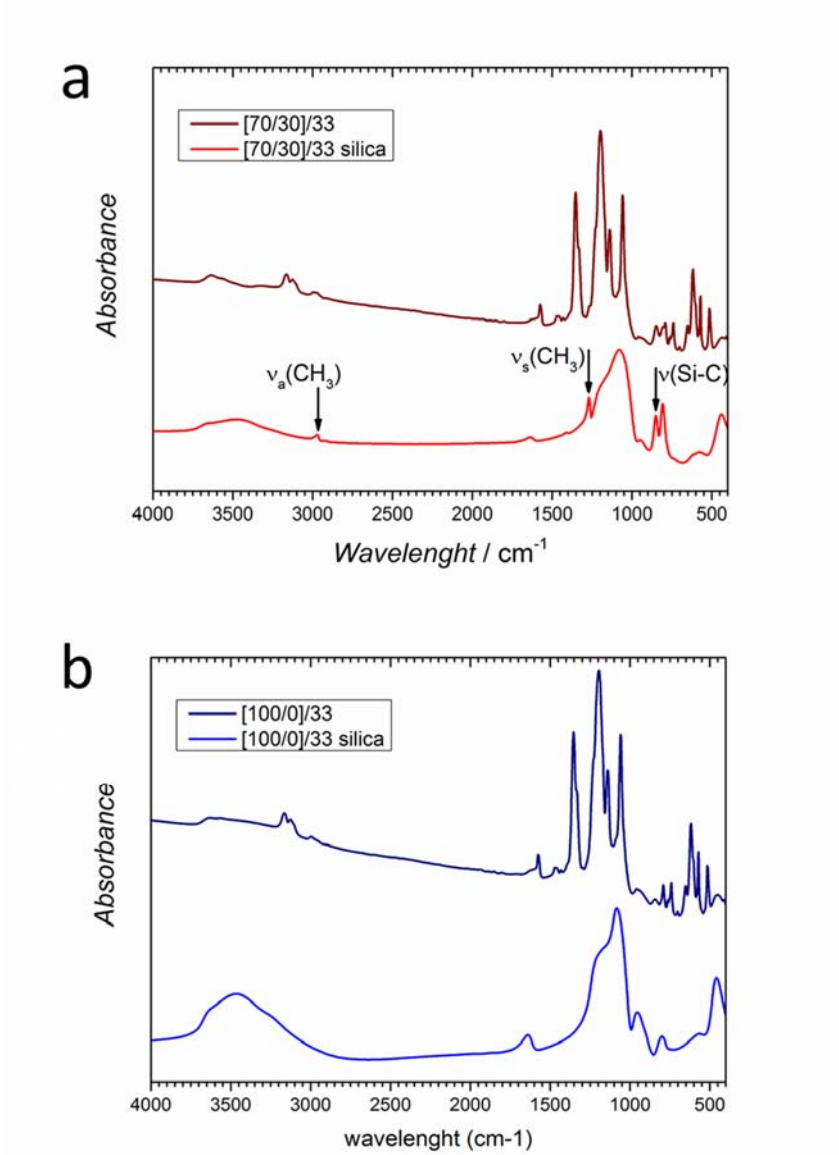

Fig. S6 (a) FTIR spectrum of the [70/30]/33 ionogel and silica host networks from [70/30]/33 after Soxhlet extraction of the EMIm TFSI. Absorbance bands due to the methyl groups in the [70/30]/33 are marked by the black arrows. (b) FTIR spectrum of the [100/0]/33 ionogel and silica host networks from [100/0]/33 after Soxhlet extraction of the EMIm TFSI.

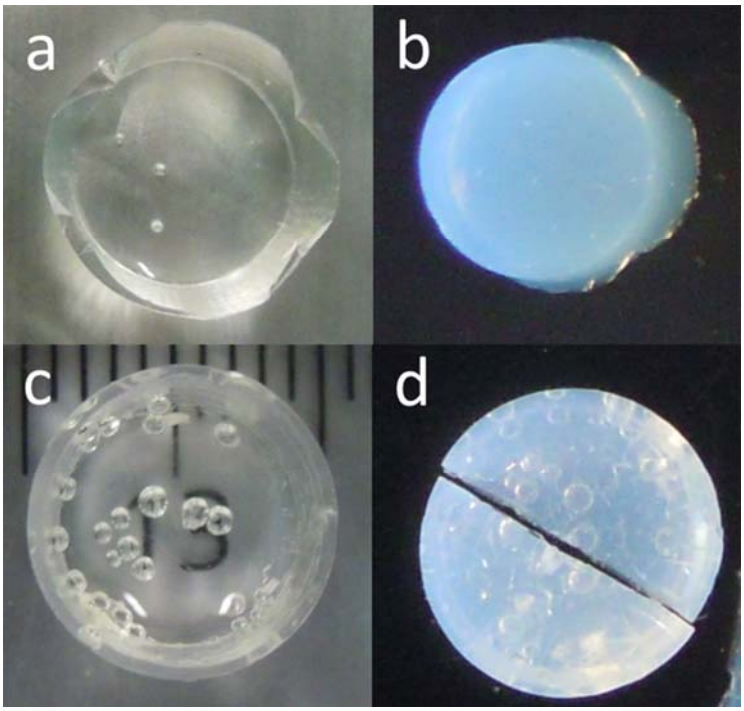

Fig. S7 The [100/0]/33 ionogel pellet before (a) and after (b) EMIm TFSI extraction and drying in a Buchi (60 °C, under vacuum, 18 h). The [70/30]/33 ionogel pellet before (c) and after (d) liquid extraction and drying in a Buchi (60 °C, under vacuum, 18 h). The pellets' diameters are around 8-9 mm.

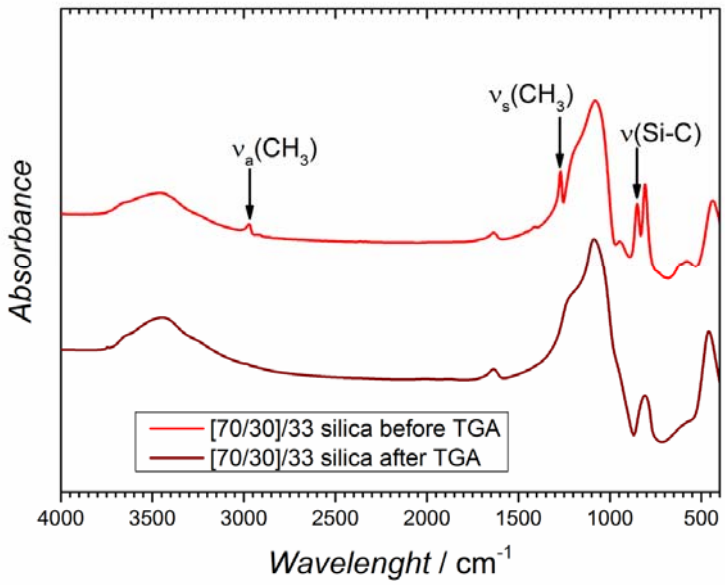

Fig. S8 FTIR spectrum of the [70/30]/33 host network, after Soxlhet extraction of the EMIm TFSI, before (a) and after (b) TGA analysis under an O_2 atmosphere at 2 °C.min^{-1} up to 800 °C. Absorbance bands due to the presence of methyl groups are marked by the black arrows.

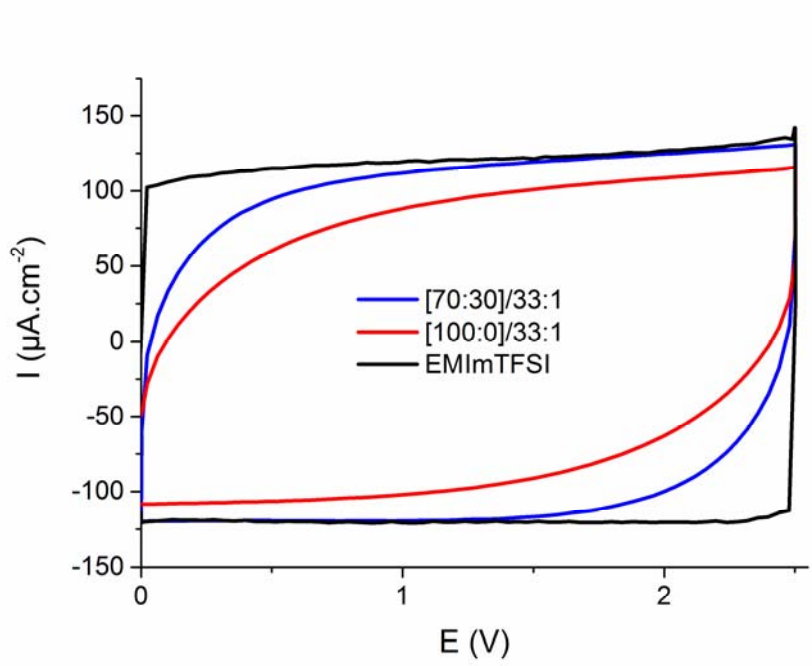

Fig. S9 Cyclic voltammetry (1 V.s-1) of micro-supercapacitors (µSCs) with non-confined EMIm TFSI, [100/0]/33 and [70/30]/33 electrolytes, using SiNW electrodes with lengths of 20 µm.

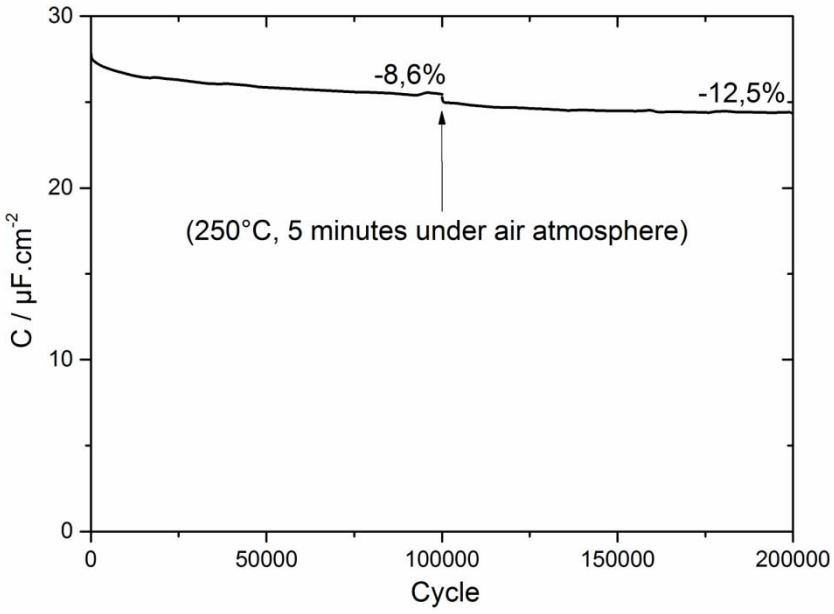

Fig. S10 GCPL (20 µA between 0 V and 3 V) for 20 µm SiNWs with [70/30]/33 ionogel : 100000 cycles before solder reflow and 100000 cycles after solder reflow.

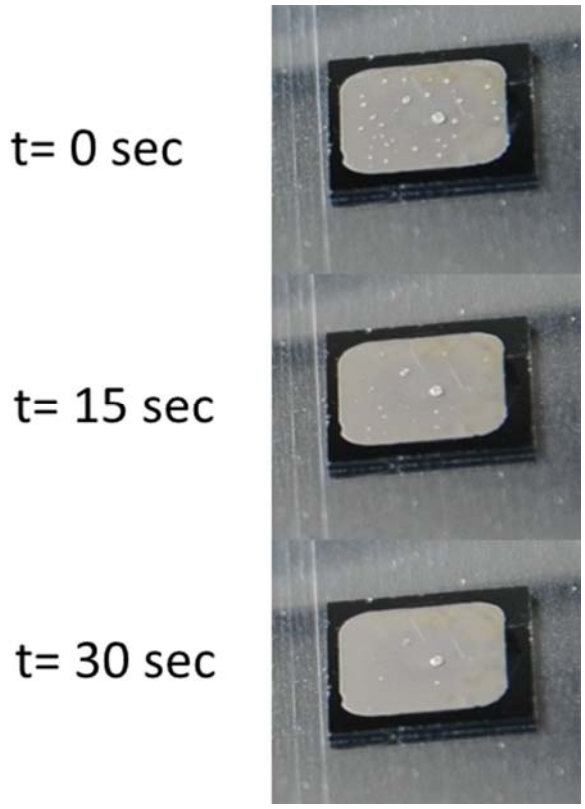

Fig. S11 Re-absorption, after annealing at 250 °C for 5 minutes of the [70/30]/33 ionogel, of the IL, subsequent to its thermal expansion : photographs taken immediately (0 s) at the exit of the oven, and after 15 s and 30s.