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

Supporting Information

Rapid Low Temperature Self-Healable Polymeric composite for Flexible Electronic Devices

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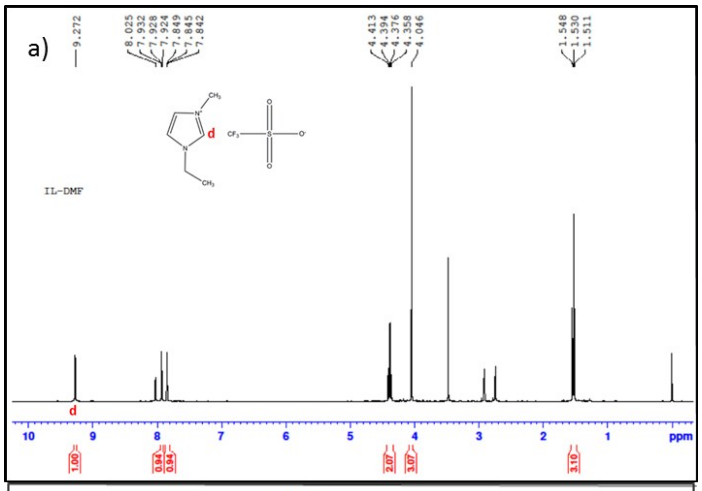
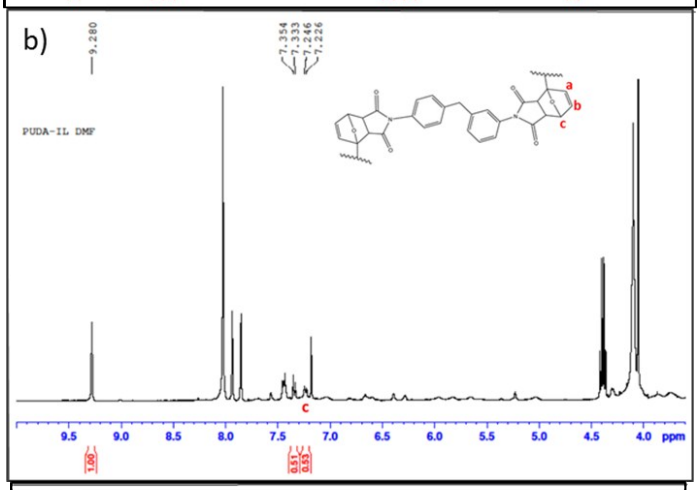

a)
9.272
8.025
7.932
7.928
7.924
7.849
7.845
7.842
4.413
4.394
4.376
4.358
4.046
1.548
1.530
1.511
d
IL-DMF
10
9
8
7
6
5
4
3
2
1
ppm
1.00
0.84
0.84
2.07
3.07
3.10


b)
9.280
7.354
7.333
7.246
7.226
a
b
c
PUDA-IL DMF
c
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
ppm
1.00
0.51
0.53

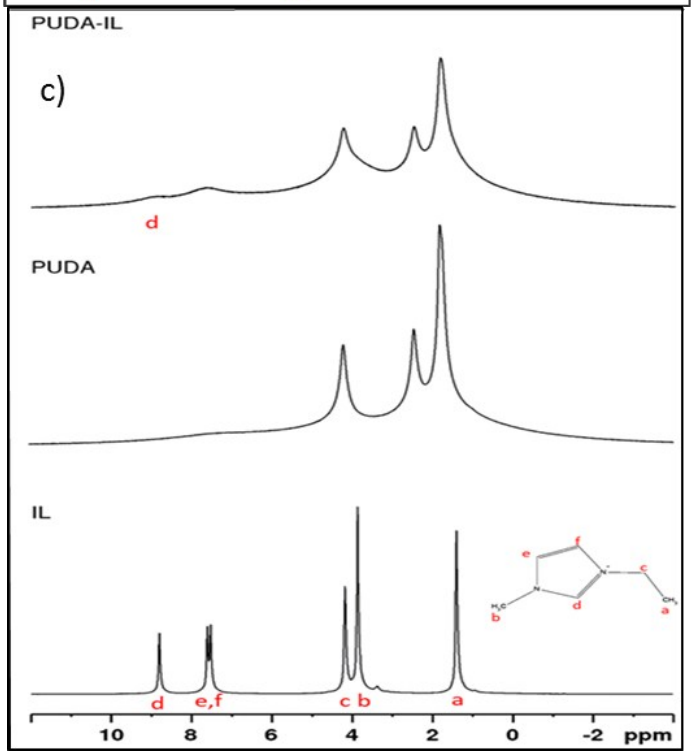

PUDA-IL
c)
d
PUDA
IL
e
f
c
d
a
b
d
e,f
c b
a
10
8
6
4
2
0
-2
ppm

Figure S1: a) and b) ^{1}H liquid-state NMR spectra of PU-DA/ 50 wt% EMITFS and ionic liquid (EMITFS). c) ^{1}H solid-state NMR spectra of PU-DA/ 50 wt% EMITFS film, PU-DA film and ionic liquid (EMITFS).

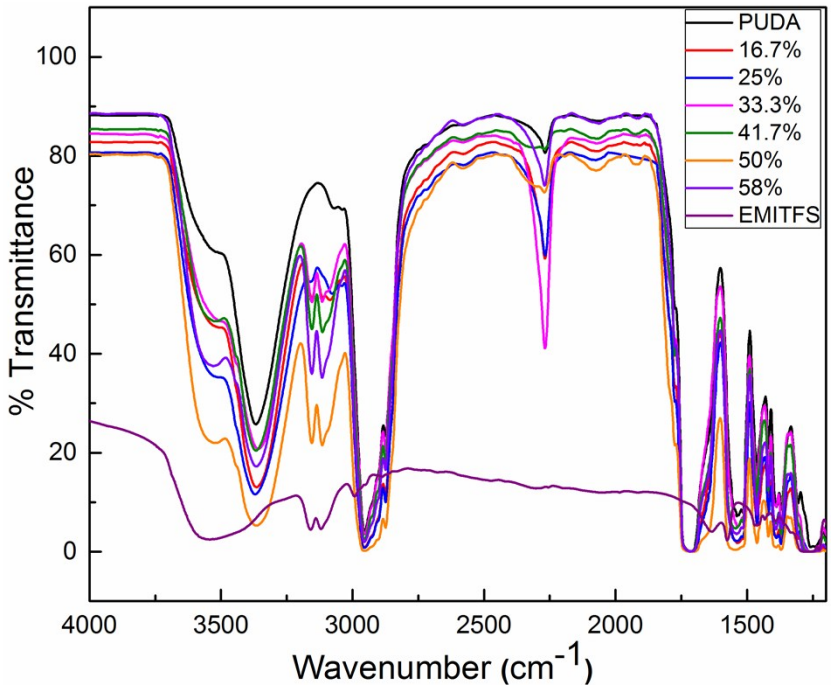


Figure S2: FTIR spectrum of PU-DA, 16.7 wt % EMITFS in PU-DA, 25 wt % EMITFS in PU-DA, 33.3 wt % EMITFS in PU-DA, 41.7 wt % EMITFS in PU-DA, 50 wt % EMITFS in PU-DA, 58.3 wt % EMITFS in PU-DA and EMITFS (IL).

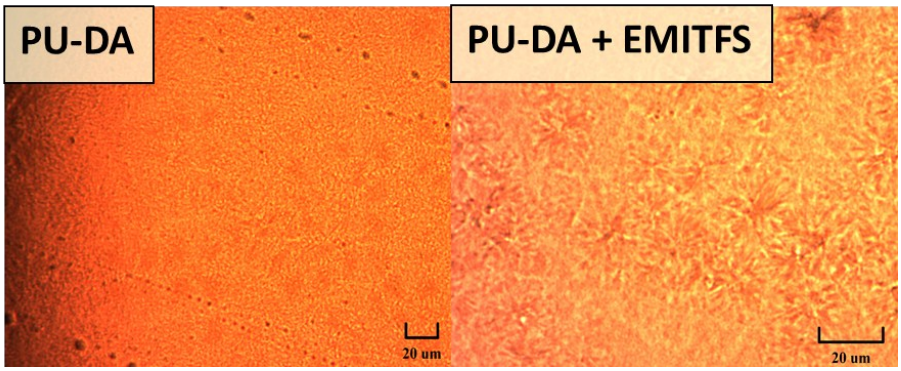


Figure S3: The optical microscopy images of PU-DA and PU-DA/ 50 wt% EMITFS, suggests that EMITFS is be homogeneously mixed within the PU-DA polymer matrix.

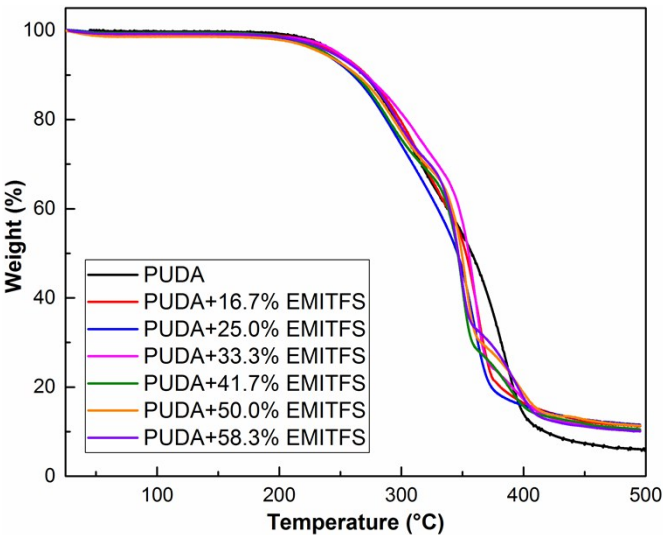


Figure S4: TGA curves of PU-DA, 16.7 wt % EMITFS in PU-DA, 25 wt % EMITFS in PU-DA, 33.3 wt % EMITFS in PU-DA, 41.7 wt % EMITFS in PU-DA, 50 wt % EMITFS in PU-DA and 58.3 wt % EMITFS in PU-DA.

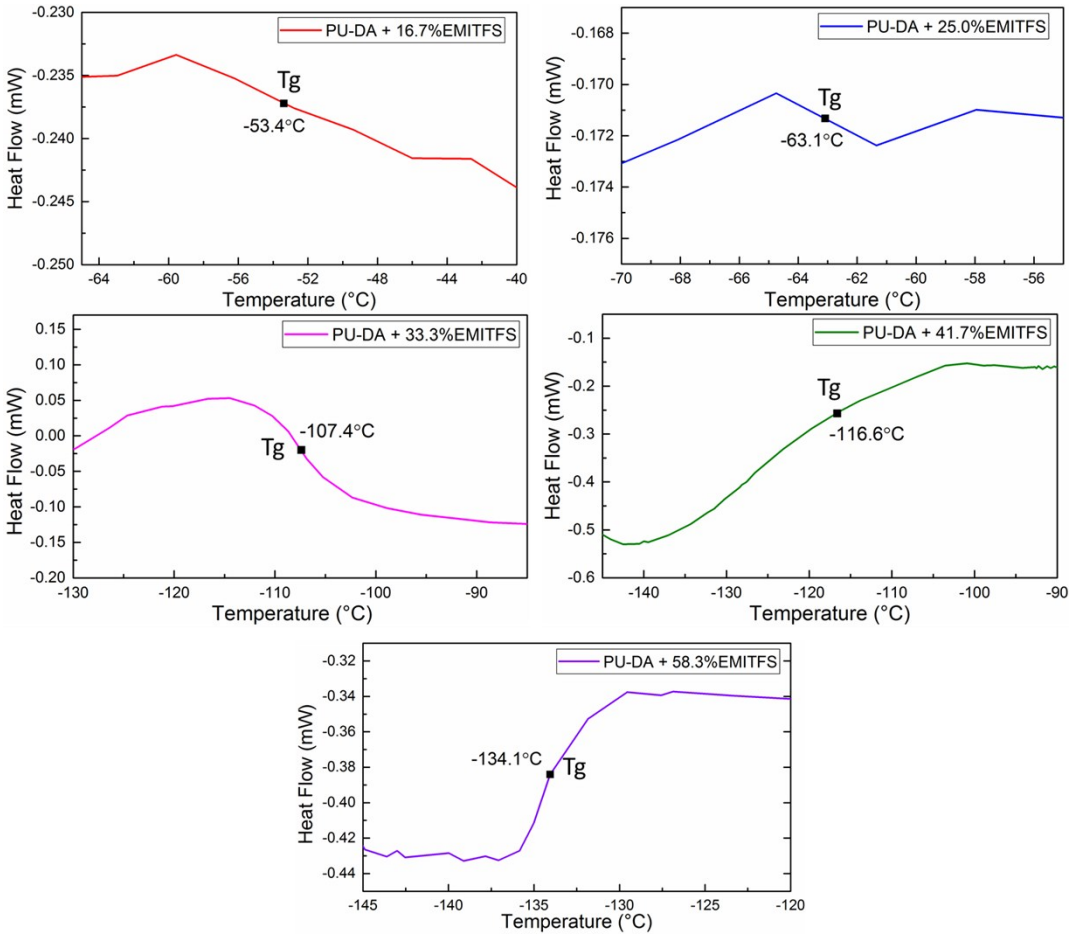


Figure S5: DSC curves of 16.7 wt % EMITFS in PU-DA, 25 wt % EMITFS in PU-DA, 33.3 wt % EMITFS in PU-DA, 41.7 wt % EMITFS in PU-DA and 58.3 wt % EMITFS in PU-DA

Composition of EMITFS (%)	Healing Temperature (°C)
0.00 (PU-DA)	120
16.7	90
25.0	80
33.3	70
41.7	70
50.0	60
58.3	60

Table S1: The healing temperatures of the different composition of EMITFS in PU-DA film. All the film was of same thickness (20 µm) and kept at the required healing temperature according to the composition of EMITFS for 10 mins.

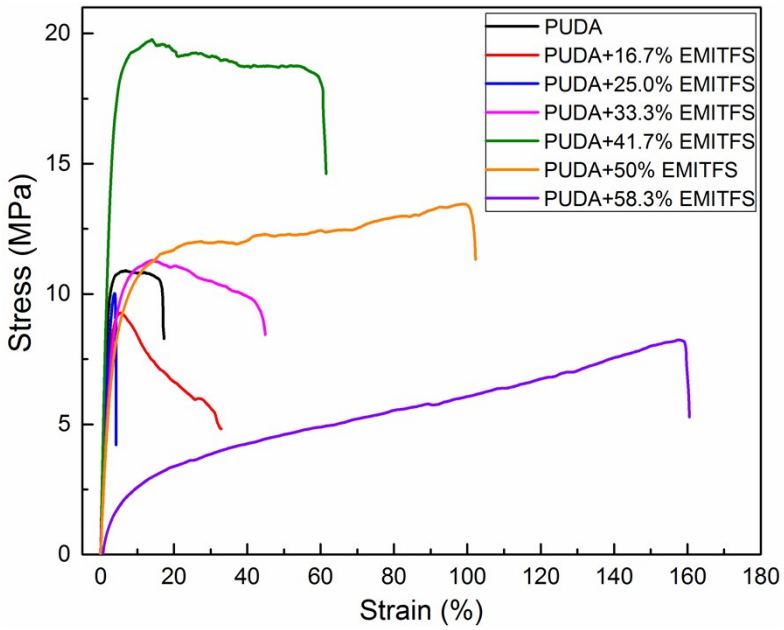


Figure S6: Stress-strain curves of PU-DA, 16.7 wt % EMITFS in PU-DA, 25 wt % EMITFS in PU-DA, 33.3 wt % EMITFS in PU-DA, 41.7 wt % EMITFS in PU-DA, 50 wt % EMITFS in PU-DA and 58.3 wt % EMITFS in PU-DA.

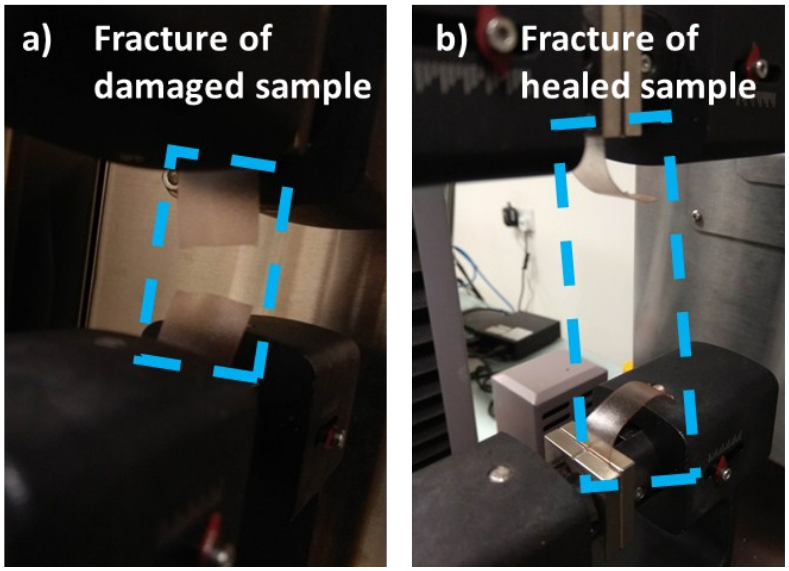


Figure S7: Image of the fracture of the damaged sample (a) and the healed sample (b).

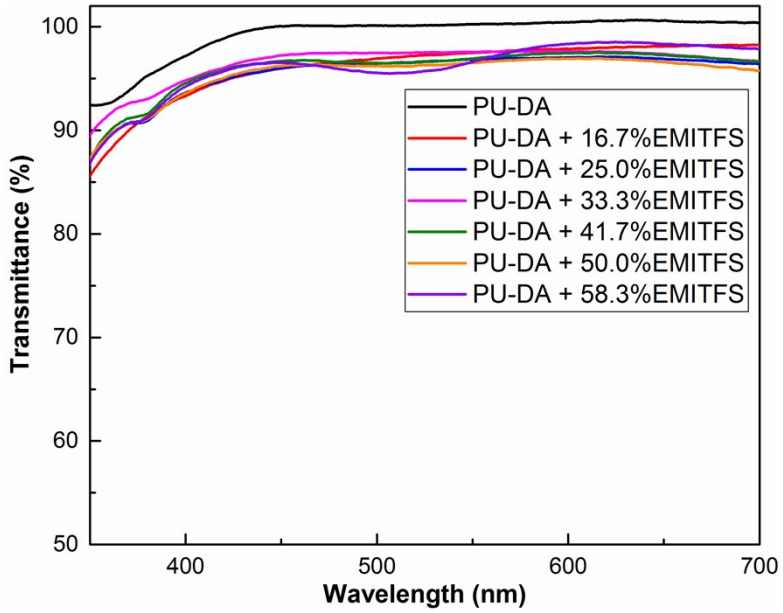


Figure S8: Transmittance spectrum of PU-DA, 16.7 wt % EMITFS in PU-DA, 25 wt % EMITFS in PU-DA, 33.3 wt % EMITFS in PU-DA, 41.7 wt % EMITFS in PU-DA, 50 wt % EMITFS in PU-DA and 58.3 wt % EMITFS in PU-DA. The change in transmittance of 58.3 wt % EMITFS in PU-DA was due to the non-uniformity of the film.

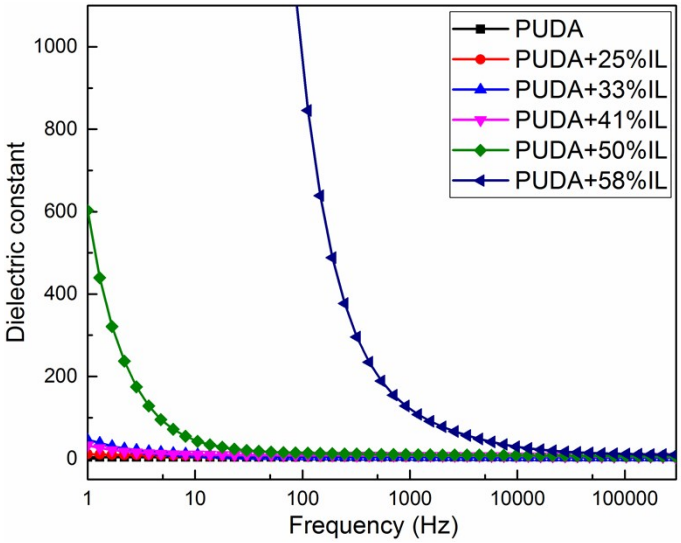


Figure S9: Dielectric constant of PU-DA/EMITFS film with various concentration of EMITFS added: PU-DA, 25 wt % EMITFS in PU-DA, 33.3 wt % EMITFS in PU-DA, 41.7 wt % EMITFS in PU-DA, 50 wt % EMITFS in PU-DA and 58.3 wt % EMITFS in PU-DA.

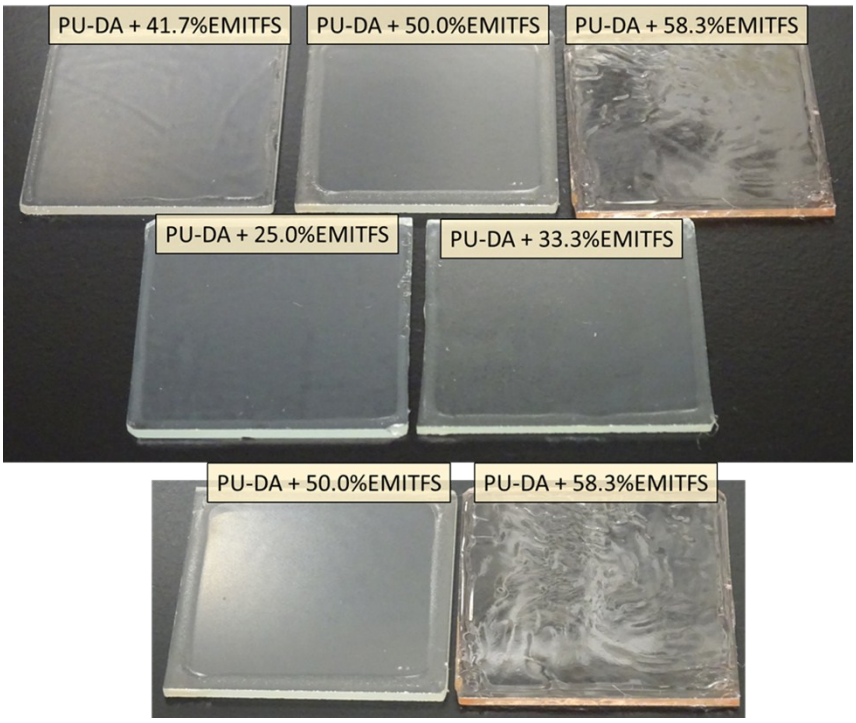


Figure S10: Spin coated sample of EMITFS in PU-DA. All the samples are coated over glass at 1000 rpm for 20 s. Comparison of Surface Uniformity between PU-DA + 50.0% EMITFS and PU-DA + 58.3% EMITFS.