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

Lightweight and flexible conducting polymer sponges and hydrogels for electromagnetic interference shielding

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Fig. S1 The rectangular opening of the WR 90 waveguide (22.86 mm × 10.16 mm) completely covered with PEDOT:PSS hydrogel film.

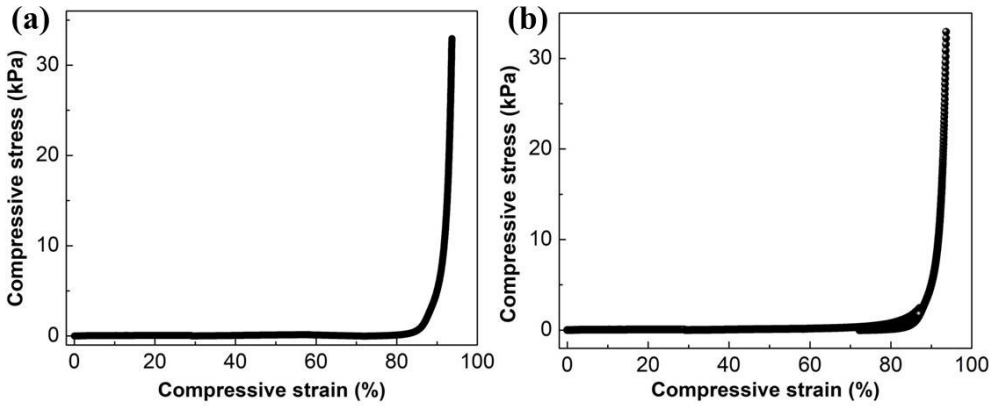

Fig. S2 (a-b) Compressive stress-strain curve of PEDOT:PSS sponge (sample 2 and sample 3).

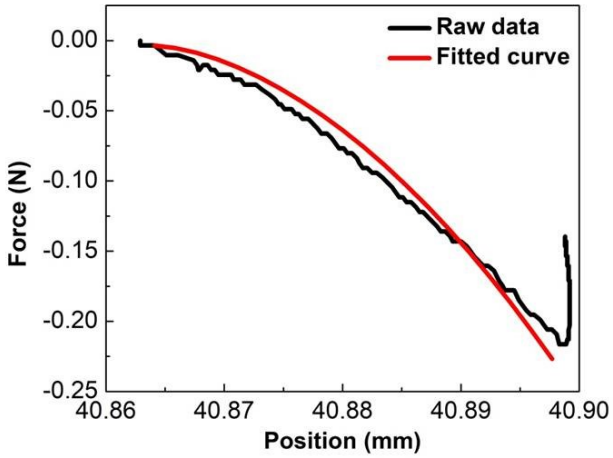

Fig. S3 Force versus position plot (indentation test). 0.5 mm diameter spherical indenter attached to a load cell was indented on the hydrogel film to estimate the Young's modulus. Black and red solid line represent raw data and fitted curve, respectively.

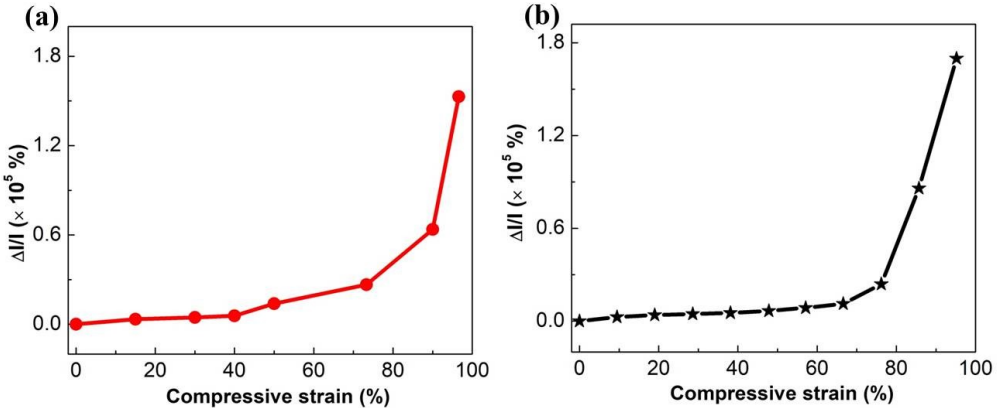

Fig. S4 (a-b) Variation of normalized current as a function of strain under unconfined compression for PEDOT:PSS sponge (sample 2 and sample 3).

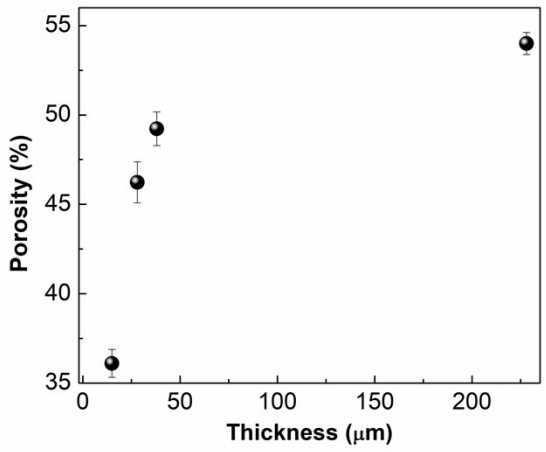

Fig. S5: Variation of porosity as a function of PEDOT:PSS hydrogel film thickness.

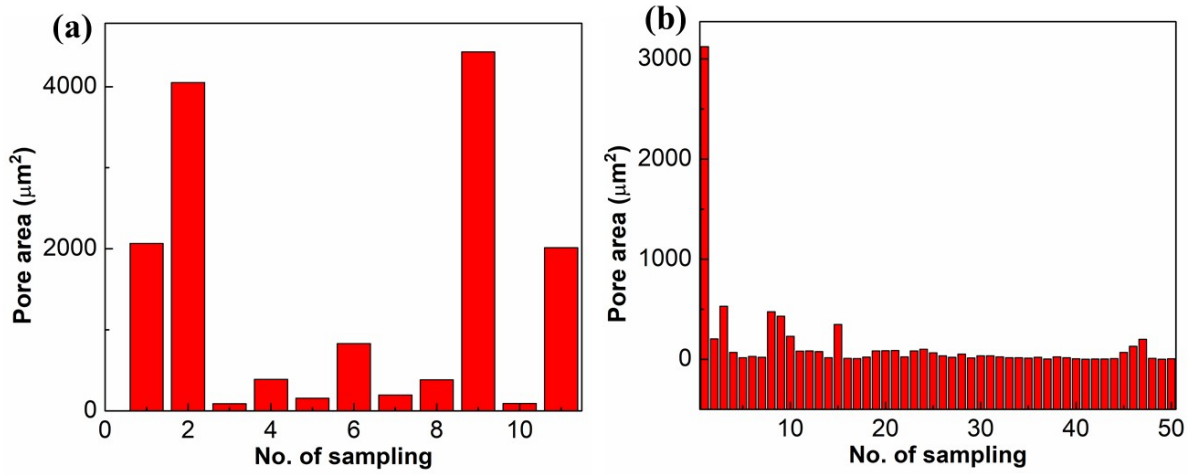

Fig. S6: (a-b) Bar plot of pore area as a function of number of sampling for uncompressed and compressed PEDOT:PSS sponge.

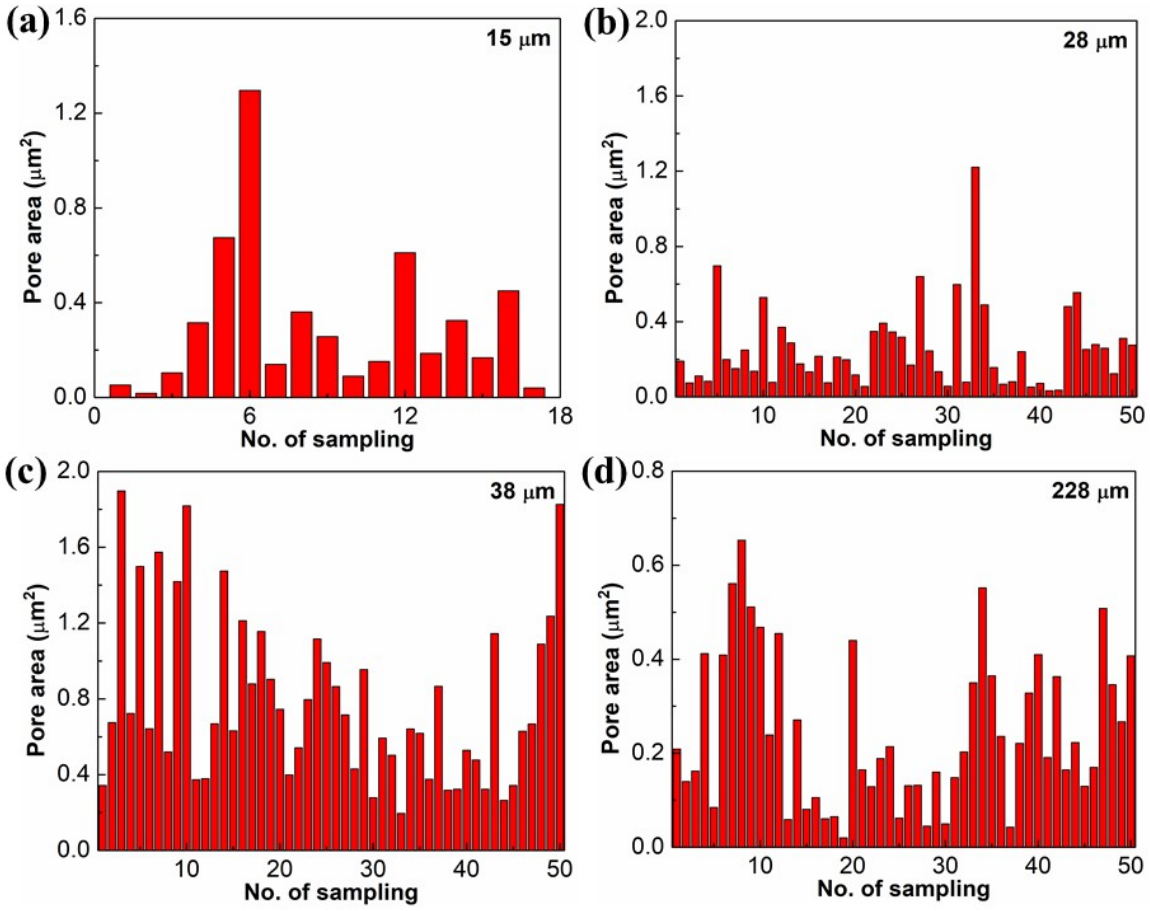

Fig. S7: (a-d) Bar plot of pore area as a function of number of sampling for 15 μm, 28 μm, 38 μm and 228 μm thick PEDOT:PSS hydrogel film.

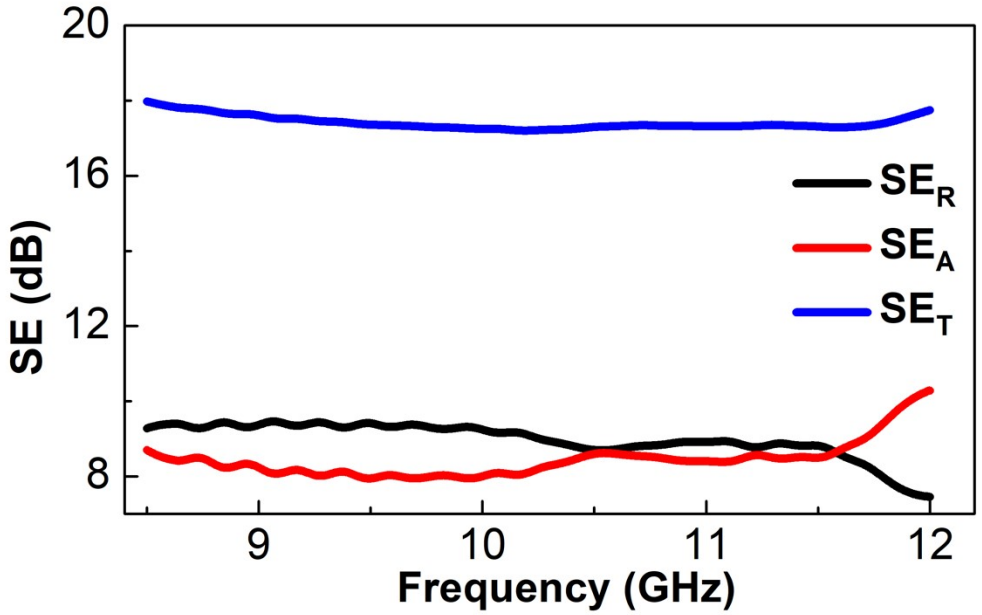

Fig. S8: Variation of EMI SE as a function of frequency for a pure PEDOT:PSS film.

EMI shielding parameters (dB)	PEDOT:PSS sponges		PEDOT:PSS hydrogel films				Pristine PEDOT:PSS film (40 µm)
	Uncompressed	Compressed	15 µm	28 µm	38 µm	228 µm	
SE_R	6.81	10.77	18.16	33.23	33.76	27.28	9.38
SE_A	6.67	12.11	24.54	23.05	30.54	68.47	8.23
SE_T	13.48	22.92	42.70	56.30	64.30	95.83	17.60

Table S1: Comparison table of EMI shielding properties of PEDOT:PSS sponges, hydrogel films and a pristine PEDOT:PSS film. All the SE values are estimated at a representative frequency value of 9 GHz.

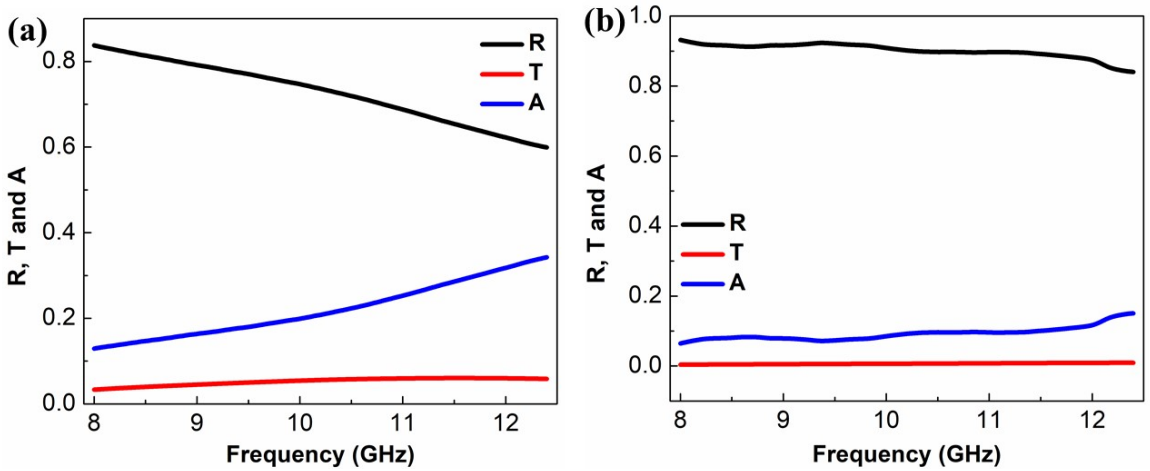

Fig. S9: (a-b) Variation of R, T and A as a function of frequency for uncompressed and compressed PEDOT:PSS sponges.

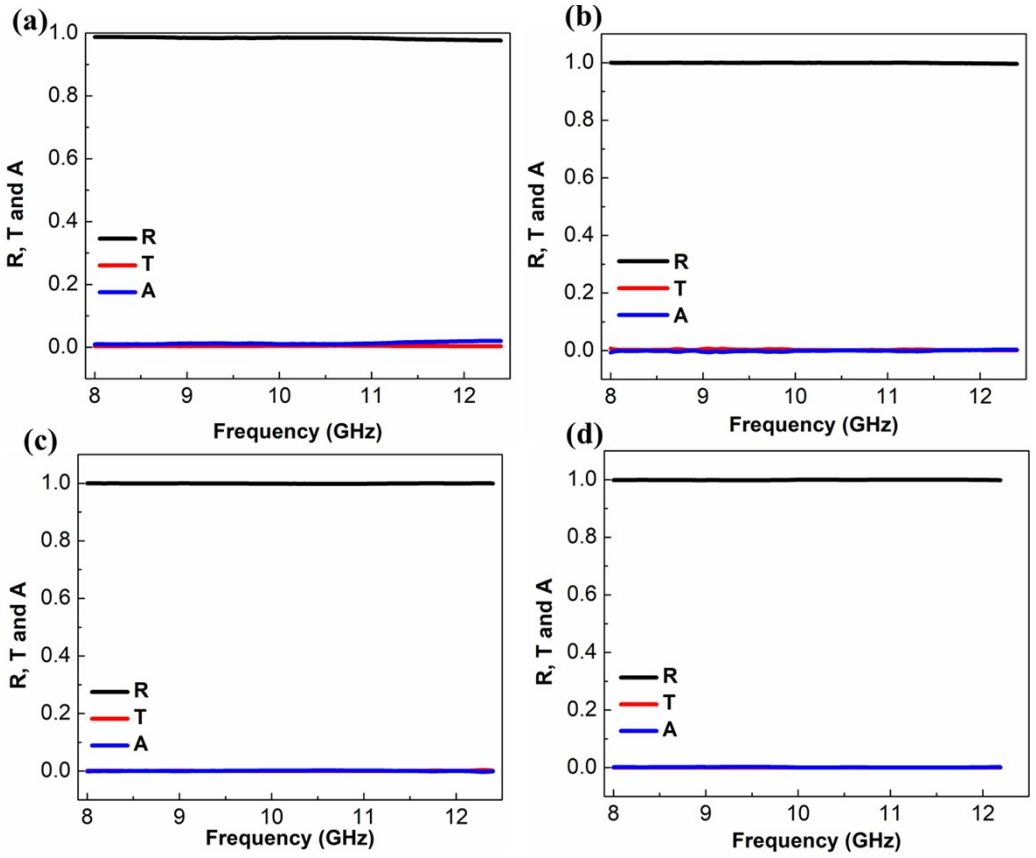

Fig. S10: (a-d) Variation of R, T and A as a function of frequency for 15 µm, 28 µm, 38 µm and 228 µm thick PEDOT:PSS hydrogel film.

Sponges	Porosity	SE_R	SE_A	SE_T
Uncompressed	96±1.28	6.81	6.67	13.48
Compressed	48.6±1.1	10.77	12.11	22.92

Table S2: Values of porosity and SE for both uncompressed and compressed PEDOT:PSS sponge. Note, SE values are taken at a representative frequency value of 9 GHz.

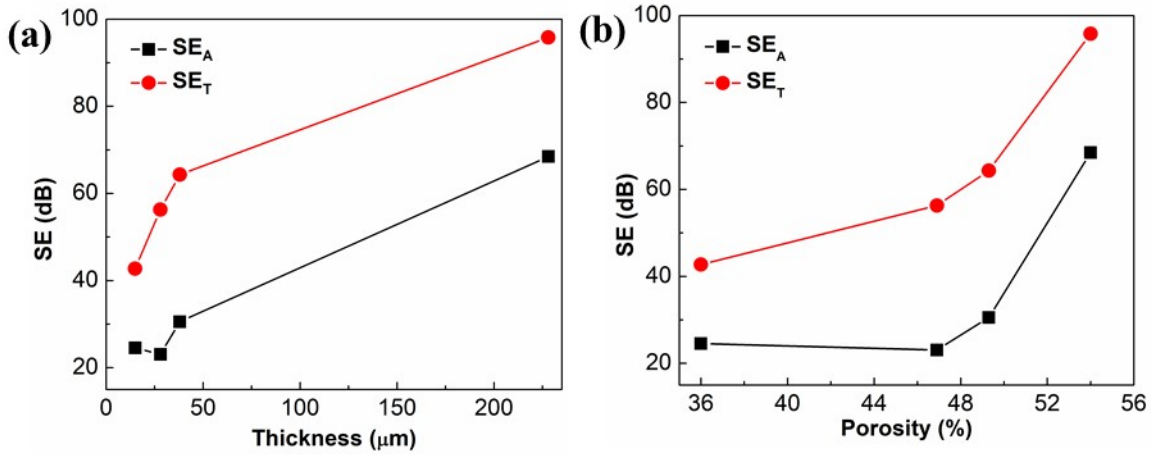

Fig. S11: (a-b) Variation of SE_A and SE_T as a function of thickness and porosity for PEDOT:PSS hydrogel films. Note, SE values are taken at a representative frequency value of 9 GHz.