Supporting Information for

A Flexible Polyelectrolyte-Based Gel Polymer Electrolyte for High-Performance All-Solid-State Supercapacitor Application

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Table S1. Room temperature ionic conductivity and mechanical properties of GPE film with different mass ratios (C_3(Br)DMAEMA: PEGMA) and different electrolyte solution concentrations.

The mass ratio of GPE components (C_3(Br)DMAEMA : PEGMA)	Li_2SO_4/H_2O solution concentration (mol L^{-1})	Conductivity (mS cm^{-1})	Mechanical properties
9:1	0.5	45.2	Stretchable
	1	56.3	Stretchable
	1.5	56.6	Hard
	2	55.4	Hard
8:2	0.5	58.9	Stretchable
	1	66.8	Stretchable
	1.5	66.2	Stretchable
	2	59.4	Hard

7:3	0.5	38.4	A little brittle
	1	45.1	A little brittle
	1.5	44.7	Too brittle
	2	40.1	Too brittle

Table S2. The ionic conductivity of hydrogel polymer electrolytes already reported and PGPE reported in this work are compared.[1-8]

Sample	Conductivity ($mS\ cm^{-1}$)	Temperature	Ref.
P(NVP-co-DMDAAC)/PVA+KOH	36.6	25 ℃	1
PVA-H_3PO_4	4.1	30 ℃	2
PVA-H_3PO_4	34	30 ℃	3
Chitosan+poly(diallyldimethylammonium chloride)+KOH	24	30 ℃	4
B-PVA+GO+KCl	47.5	RT	5
Corn starch+citric acid	2.30 ± 0.07	23 ℃	6
Carboxylated chitosan+HCl	86.9	RT	7
IL/DMSO+LiAc	39.8 ± 2.8	25 ℃	8
This work	66.8	25 ℃	

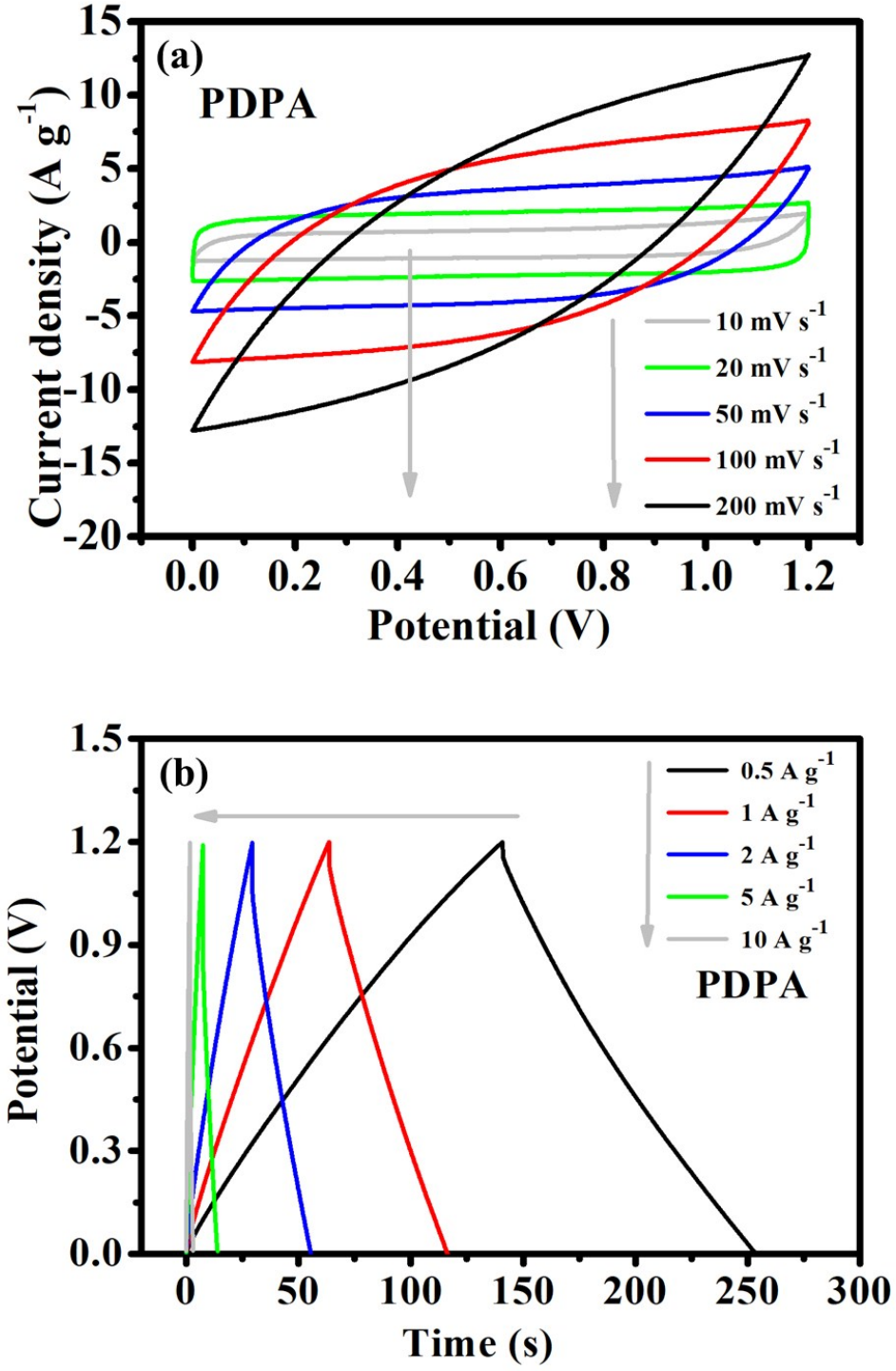

Figure S1. (a) CV curves of PDPA supercapacitor at different scan rates from 10 to 200 mV s^{-1}, (b) GCD curves at different current densities from 0.5 to 10 A g^{-1} in the voltage range of 0-1.2 V.

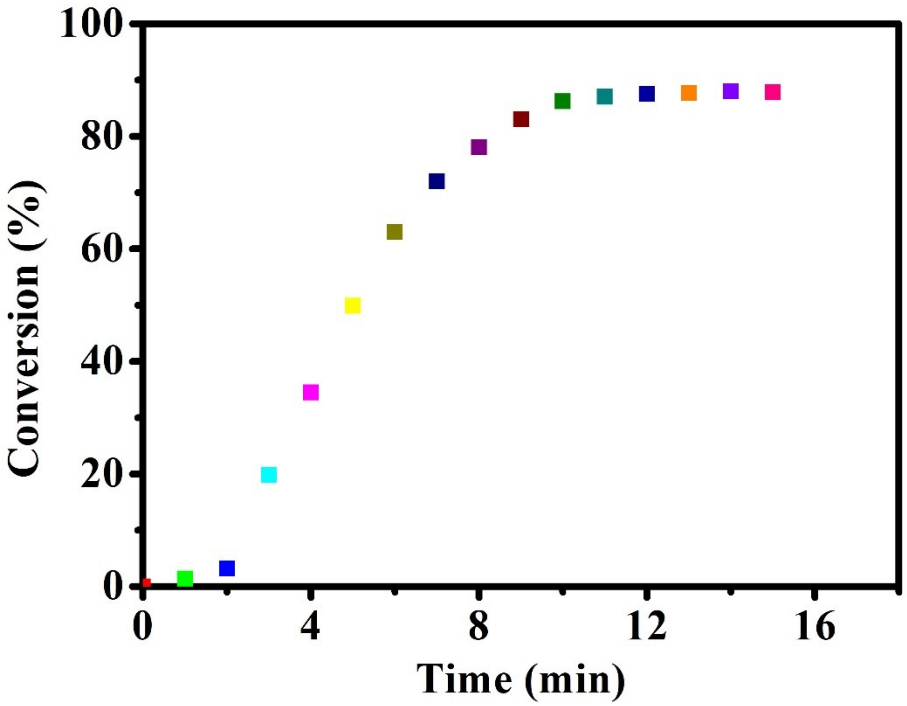

Figure S2. Curve of UV curing conversion rate at different irradiation time.

The UV curing conversion rate of the monomers (C_3(Br)DMAEMA : PEGMA= 8:2) was estimated from the concentration of carbon-carbon double bonds.[9] By considering the absorption region of infrared spectroscopy, measured by Fourier transform infrared spectrometer, where the absorption peak for C=C and C=O are in the 1637 cm^{-1} and 1720 cm^{-1} regions, respectively. The conversion rate (C) can be calculated as follows:

$$C(\%) = \frac{(A_0^{1637}/A_0^{1720}) - (A_t^{1637}/A_t^{1720})}{A_0^{1637}/A_0^{1720}}$$

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