Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Sulfonation of alginate grafted with polyacrylamide as a potential binder for high-capacity Si/C anodes

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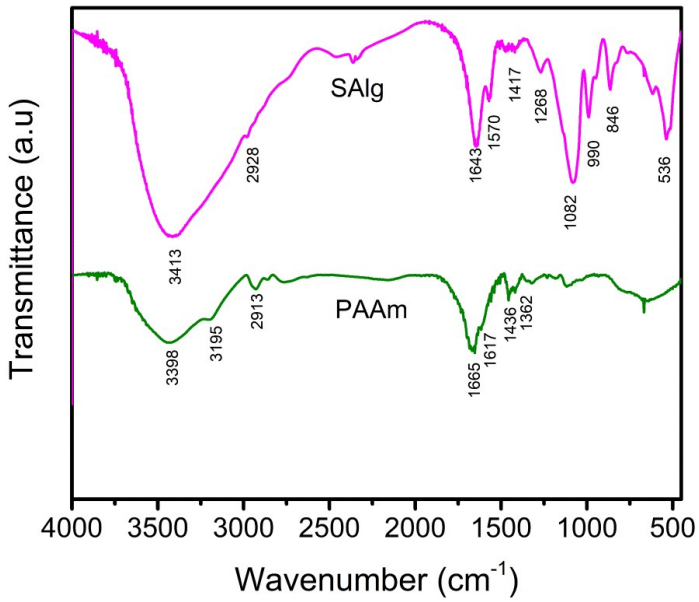

Fig. S1 FT-IR spectrometry of sulfonated Alg and of a synthetic PAAm

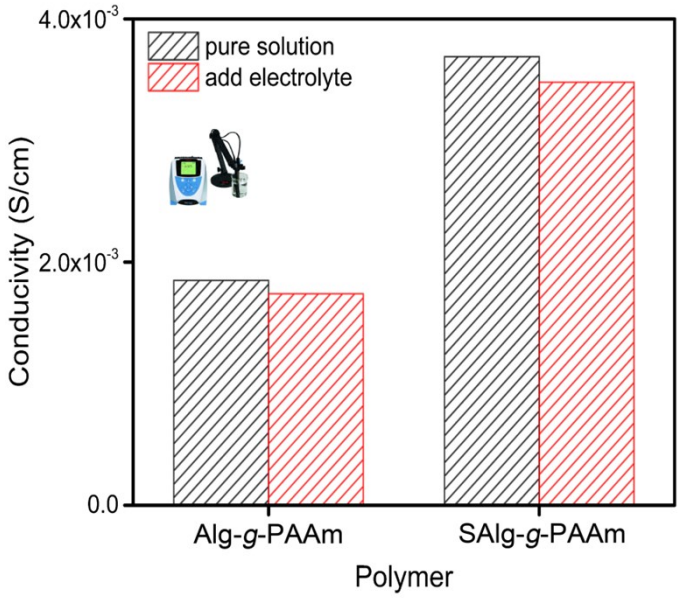

Fig. S2 Ionic conductivity of the polymeric binder solution

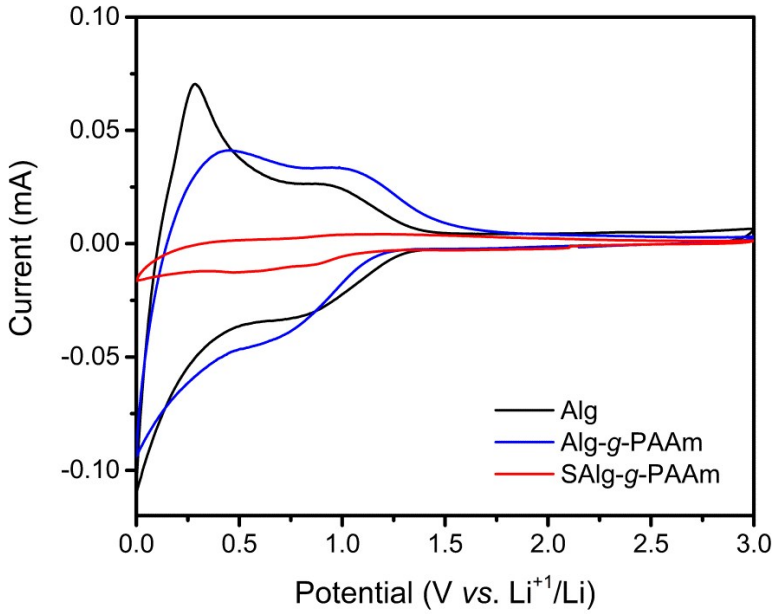

Fig. S3 CV curve of carbon black/binder with a 50/50 wt% ratio as HS-3E flat cell

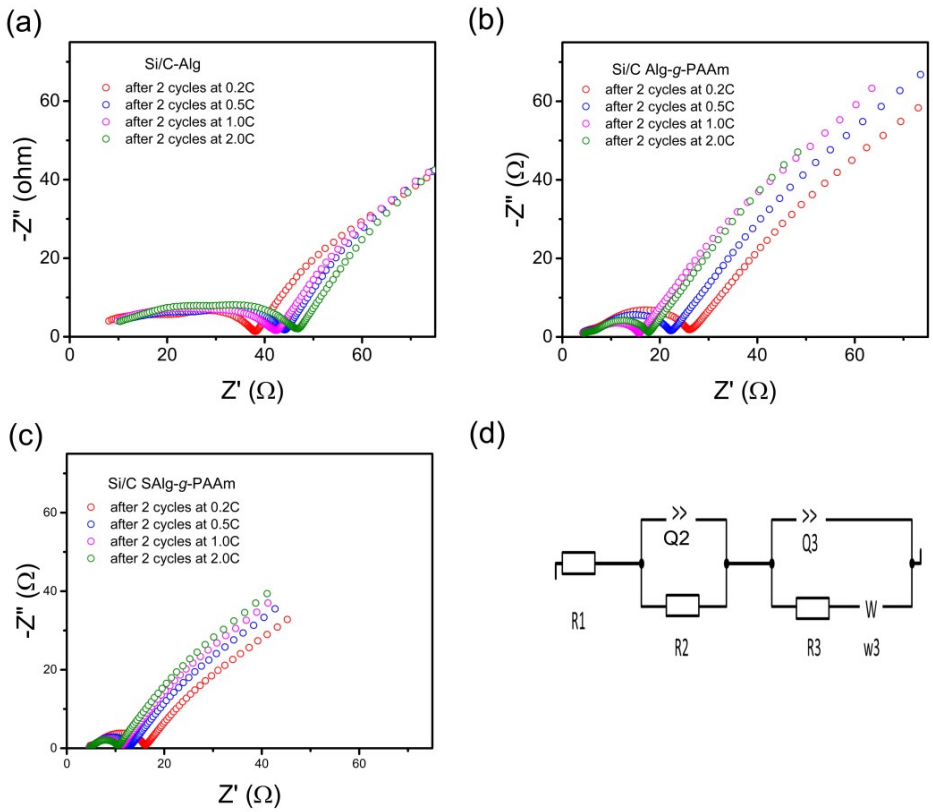

Fig. S4 Nyquist plot of the Si/C electrodes containing different binders measured after cycled process at various currents: (a) Alg, (b) Alg-g-PAAm, and (c) SAlg-g-PAAm. The cells were each cycled two times at each current, from 0.1 C to 2.0 C subsequently. After each step, EIS was measured at 0.2 V in the frequency range of 100 kHz – 0.01 Hz. (d) Equivalent circuits for the electrodes.

Table S1 Comparison on the Si/C composite electrodes containing different binders

Target binder	Electrode formulation (wt.%)	Mass loading of electrode (mg/cm^2)	Cycling performance	DOI
Sulfonated Alginate-graft-Polyacrylamide	Si/C(1:3):binder:SP 76:15:9	1.1± 0.1	750 mAh/g at 200th cycles at 0.5C	This work
		1.4± 0.1	780 mAh/g at 200th cycles at 0.5C	
Sodium Polyacrylate	SiNPs:C:binder:KB 20:60:10:10	1	616 mAh/g at 30th cycles at a rate of 50 mA/g	10.1021/jp204817h
Polyacrylic acid with different NAOH	SiNPs:C:binder:KB 30:50:10:10	0.4-0.6	1300 mAh/g at 20th cycles at a rate of 50 mA/g	10.1039/c4cp04939j
Acrylic adhesive binder	Si/C:binder:AB 85:10:5	-	500 mAh/g at 50th cycle at rate of 0.2 mA cm^{-2}	10.1007/s10800-006-9191-2
Polyacrylonitrile	Si:C:binder:VGCF 20:60:15:5	1.13 ± 0.02	more than 600 mAh/g at 50th cycles at 0.5C	10.1016/j.elecom.2013.01.010
Lithium substituted Polyacrylic acid	Si:C:binder:CB 15:73:10:2	3.3	704 ± 84 mAh/g at 90th cycles at C/20 (half cell)	10.1016/j.jpowsour.2018.02.085