Electronic Supplementary Material (ESI) for Energy & Environmental Science

Supporting Information for

High Capacity Si / Graphite Composite Electrode Having Self-Formed Porous Structure by Partially Neutralized Polyacrylate for Li-ion Batteries

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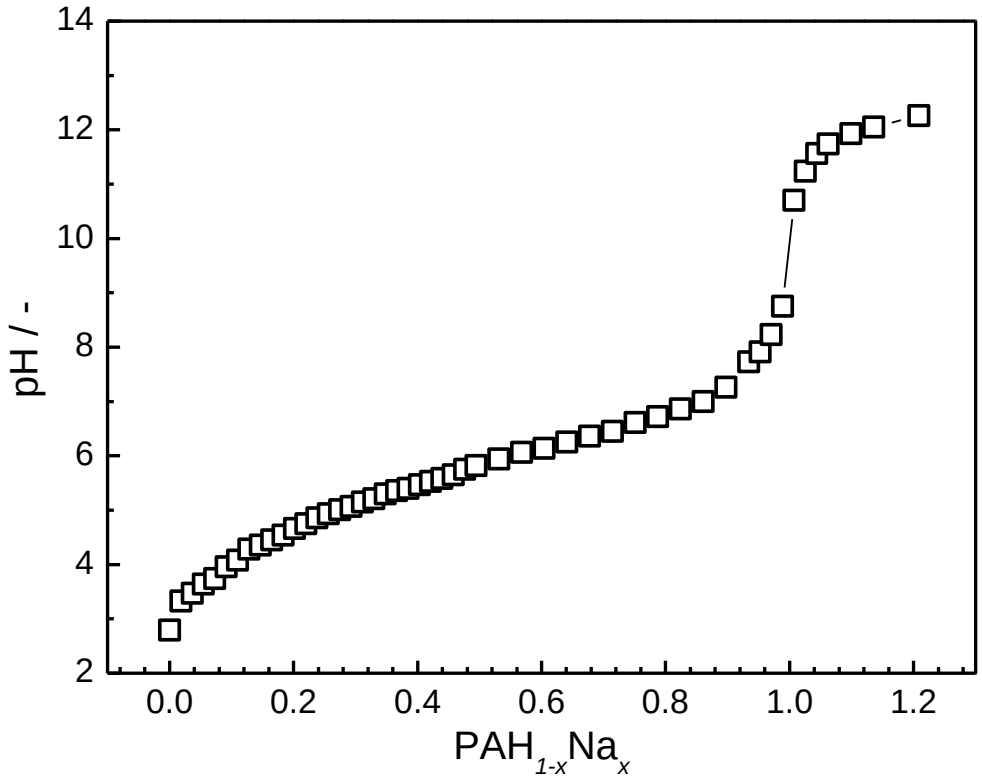

Figure S1. Change in pH for the polymer solution as a function of neutralization degrees for PAH. The concentration of PAH was fixed to be 0.005 g / ml.

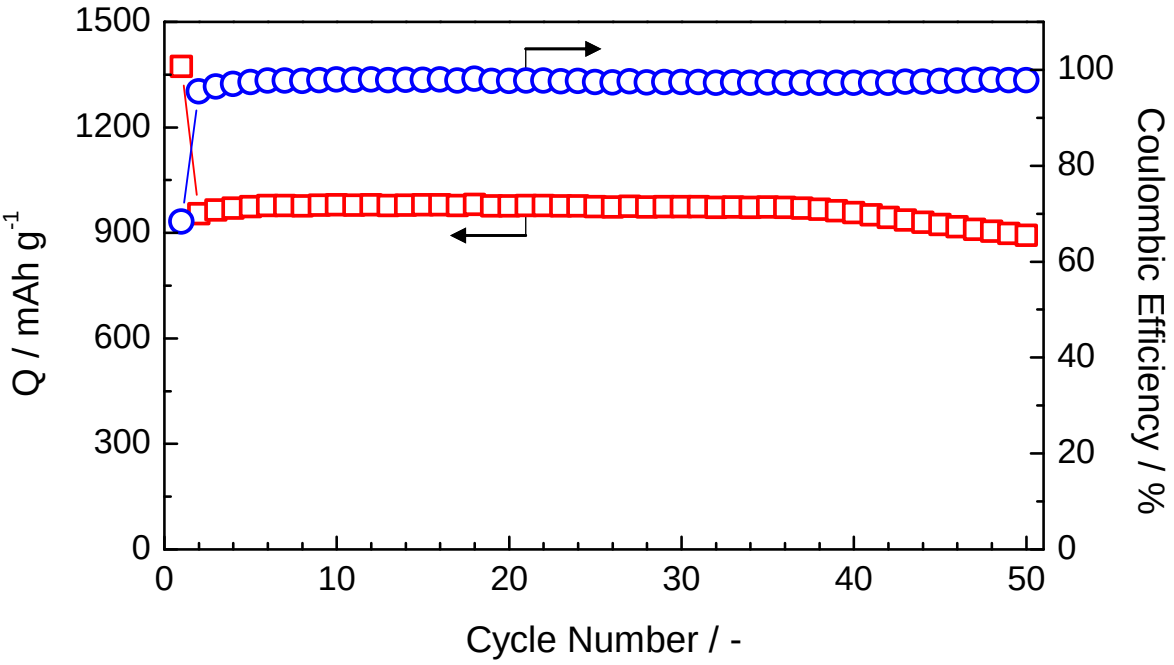

Figure S2. Cycleability of $PAH_{0.2}Na_{0.8}$ electrode in 1 mol dm^{-3} $LiPF_6$ / EC : DMC (1 : 1 by volume) without FEC as the electrolyte additive. The total duration of CC-CV mode was fixed at 10 hours to control the total capacity of 1,000 mAh g^{-1} as the maximum. The Si / graphite electrode shows capacity retention over 40 cycle test with the efficiency (approximately 97.8 % at 40^{th} cycle).

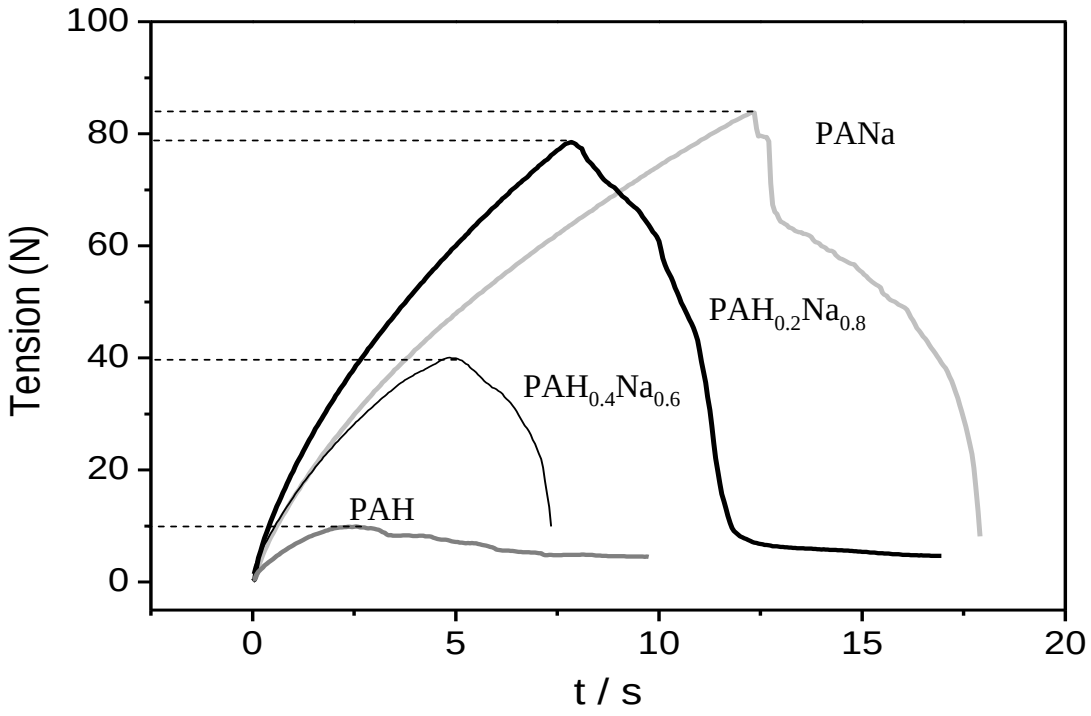

Figure S3. Adhesion strength of the Si / Graphite composites with 10 wt% PANa, $PAH_{0.2}Na_{0.8}$, $PAH_{0.4}Na_{0.6}$, PAH binders to Cu foil.

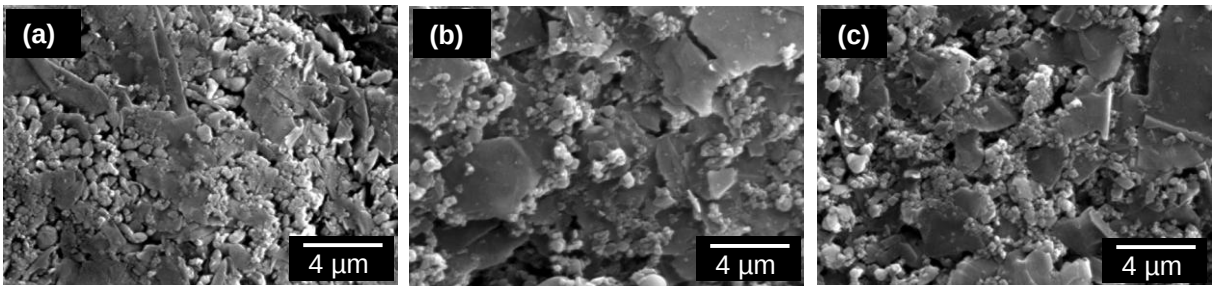

Figure S4. SEM images of the Si / graphite composite electrodes with different binders; 10 wt% PAH (a), $PAH_{0.2}Na_{0.8}$ (b) and PANa binders (c). Agglomeration of carbon and silicon is found for PAH, whereas better dispersion of active materials is observed for the neutralized PAH binders.

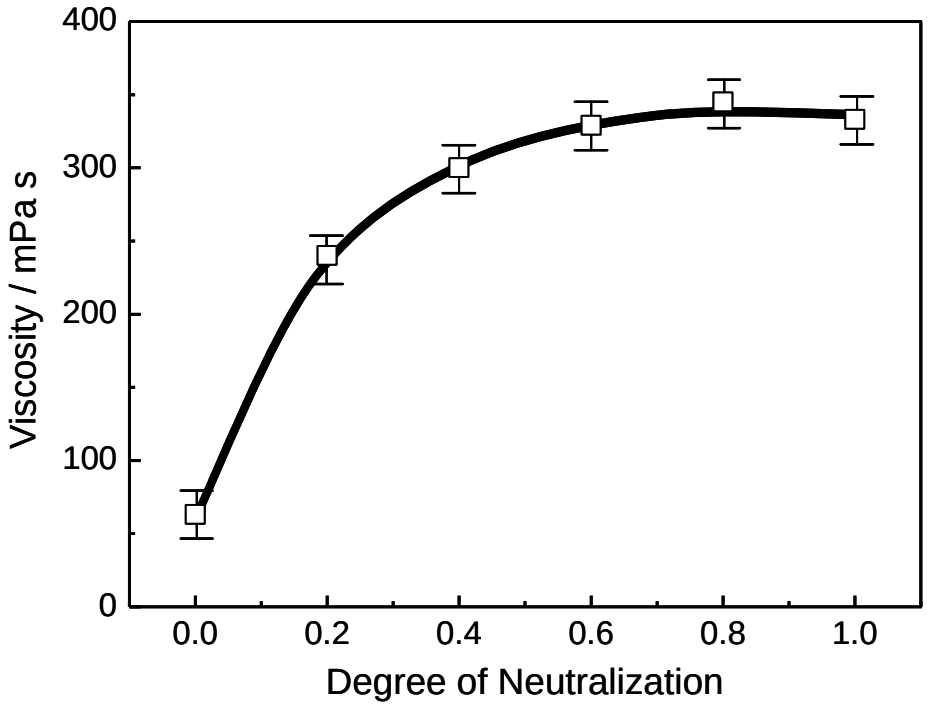

Figure S5. Dependency of viscosity on the neutralization degrees for PAH. The concentration of PAH is fixed to be 0.005 g / ml.

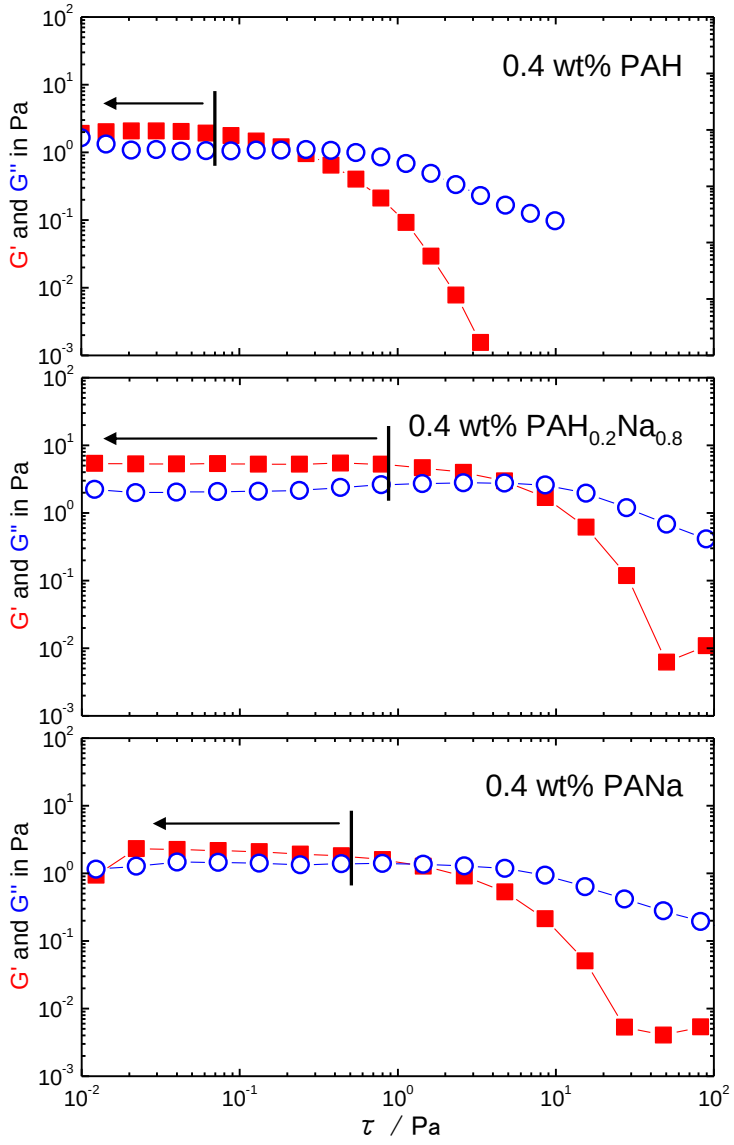

Figure S6. The oscillatory stress sweep for 0.4 wt% PAH, $PAH_{0.2}Na_{0.8}$, and PANa polymer solution. The linear viscoelastic regions for each solution were observed, which were utilized to decide the maximum pressure for the viscoelastic measurements.