Electronic Supplementary Material (ESI) for RSC Advances
This journal is © The Royal Society of Chemistry 2013

Supporting Information

Porous Carbon Sphere as a Functional Conducting Framework for Use in Lithium-Sulfur Batteries

Min-Sik Park,[a,] Ji-Sang Yu,[a] Ki Jae Kim,[a] Goojin Jeong,[a] Jae-Hun Kim,[a,b] Taeeun Yim,[a] Yong-Nam Jo,[a] Uk Hwang,[a] Shin Kang,[c] Taewoo Woo,[c] Hansu Kim,[d] and Young-Jun Kim[a,*]*

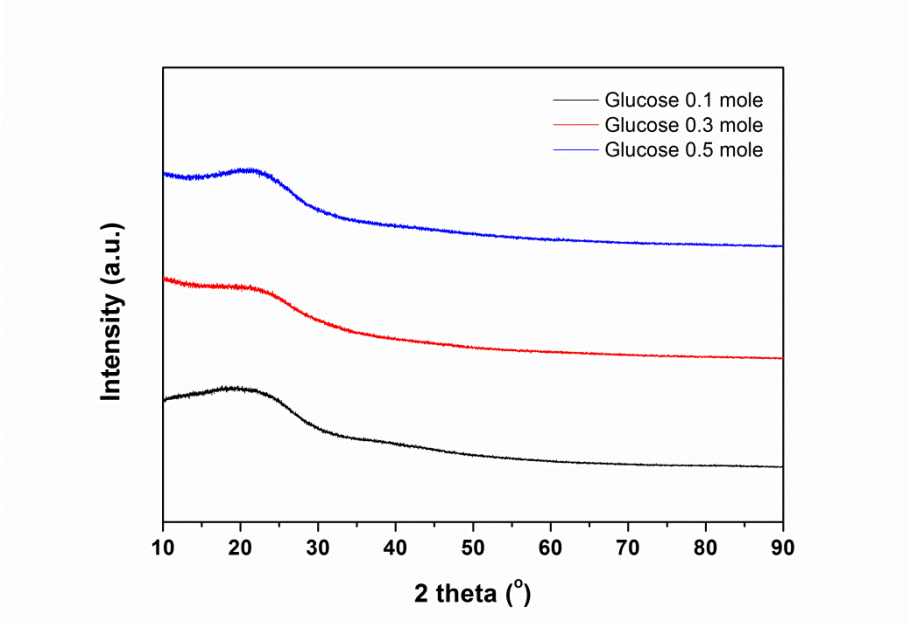

Fig. S1 Powder X-ray diffraction (XRD) patterns for CS synthesized by a hydrothermal method using glucose solutions with different concentrations (0.1 mole / 0.3 mole / 0.5 mole).

This journal is © The Royal Society of Chemistry 2013

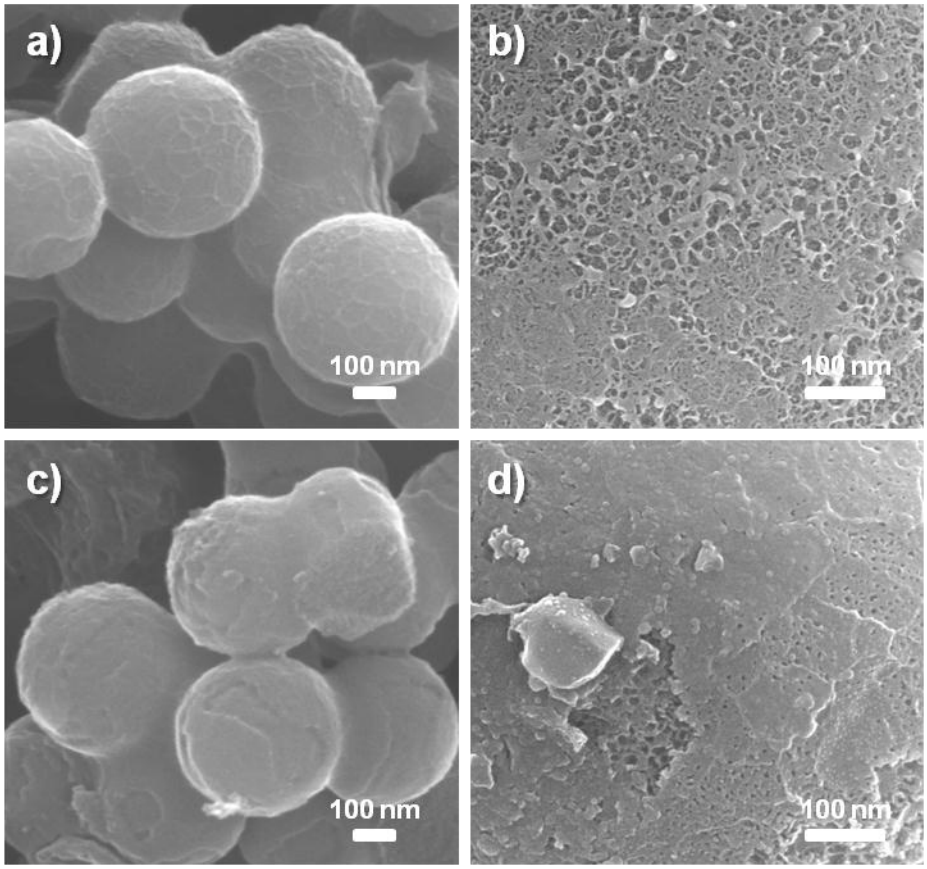

Fig. S2 FESEM images of porous CS and S-infiltrated CS at different magnifications; (a–b) porous CS and (c–d) S-infiltrated CS.

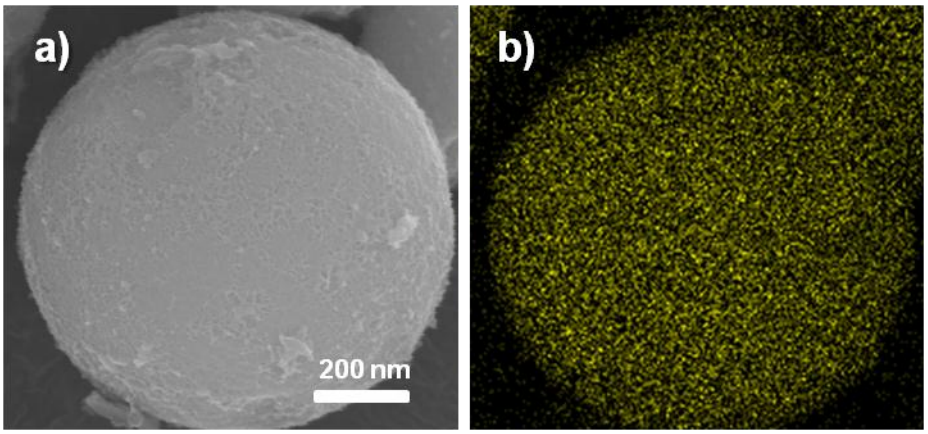

Fig. S3 Element mapping result for S-infiltrated CS; (a) FESEM image and (b) S Kα mapping result.

This journal is © The Royal Society of Chemistry 2013

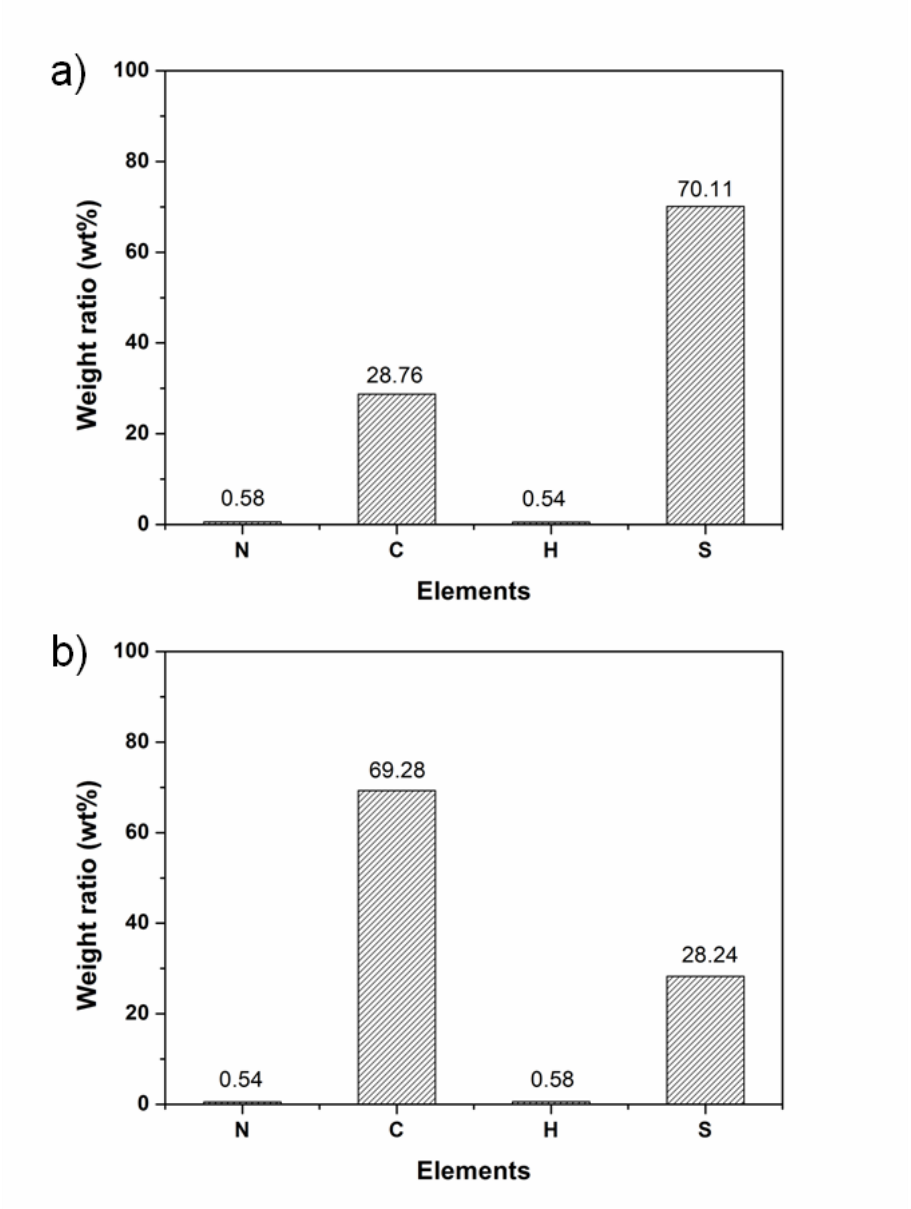

Fig. S4 The elemental composition of S-infiltrated CS (a) before CS_2 washing and (b) after CS_2 washing for removal residual S on the surface of CS. S-infiltrated CS was carefully washed using dilute CS_2 solution.

This journal is © The Royal Society of Chemistry 2013

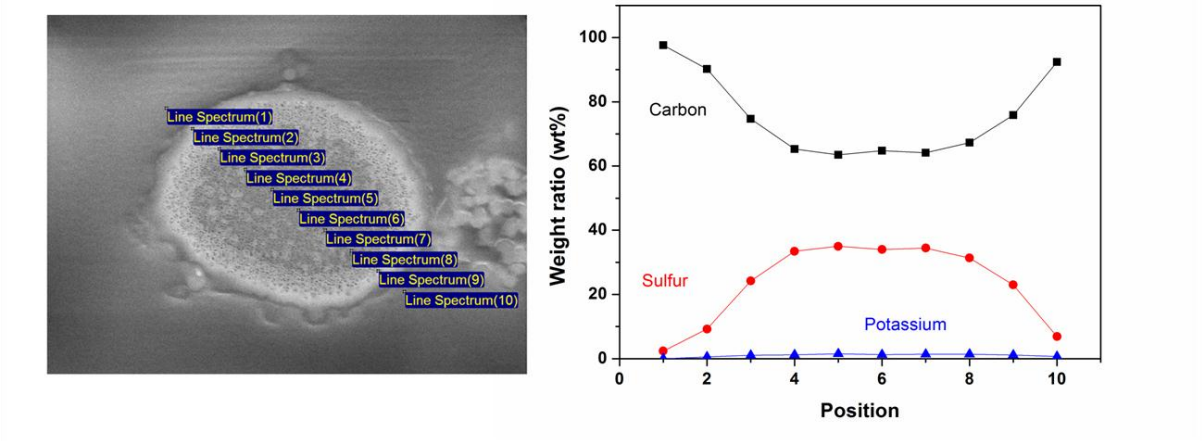

Fig. S5 Cross-sectional image of S-infiltrated CS after CS_2 washing for removal residual S on the surface of CS combined with energy dispersive spectrometer (EDS) results.

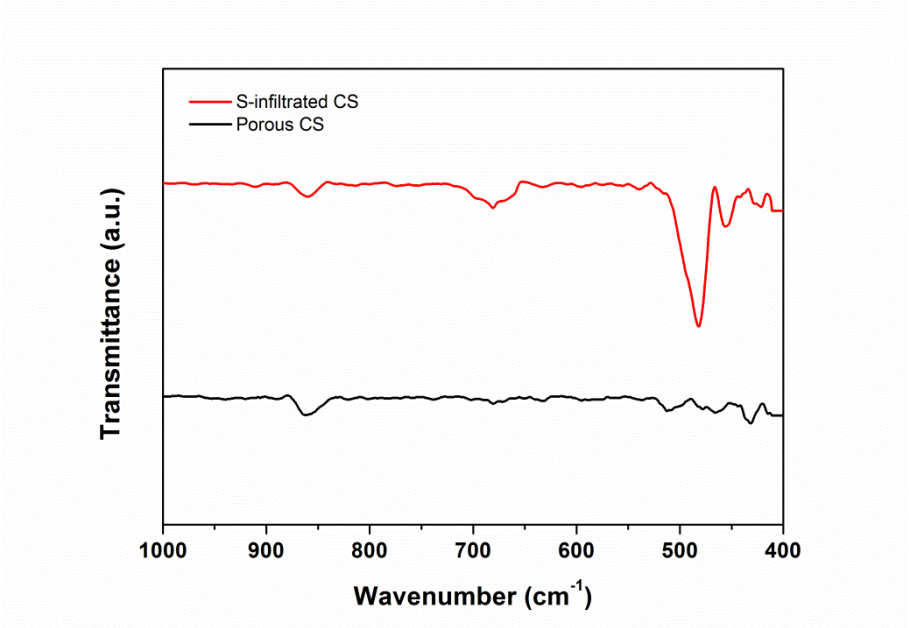

Fig. S6 A comparison of FT-IR profiles for porous CS and S-infiltated CS.

This journal is © The Royal Society of Chemistry 2013

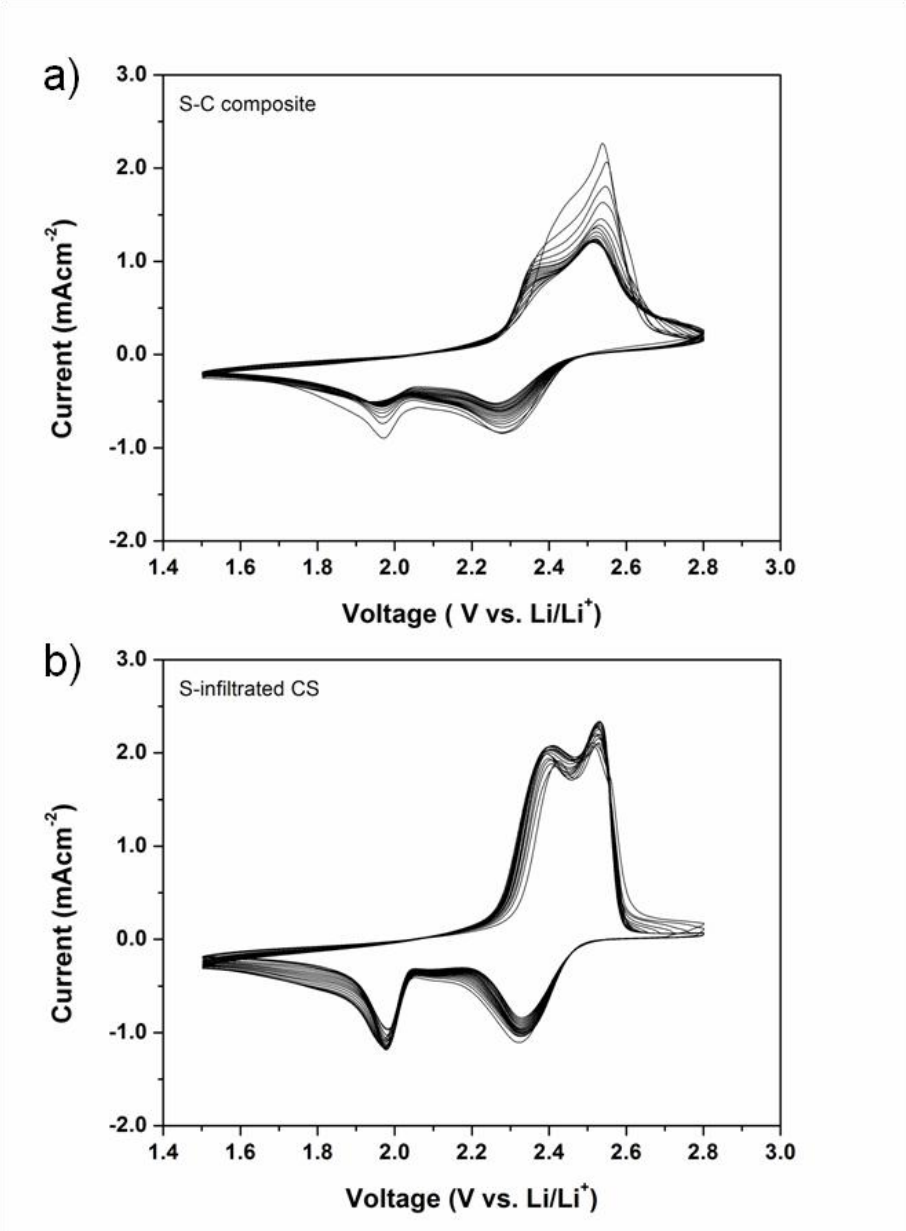

Fig. S7 Cyclic voltammograms of (a) S-C composite and (b) S-infiltrated CS during 20 cycles at a scan rate of 0.1 mVs^{-1} in a voltage range of 1.5 to 2.8 V *vs.* Li/Li^{+}.

This journal is © The Royal Society of Chemistry 2013

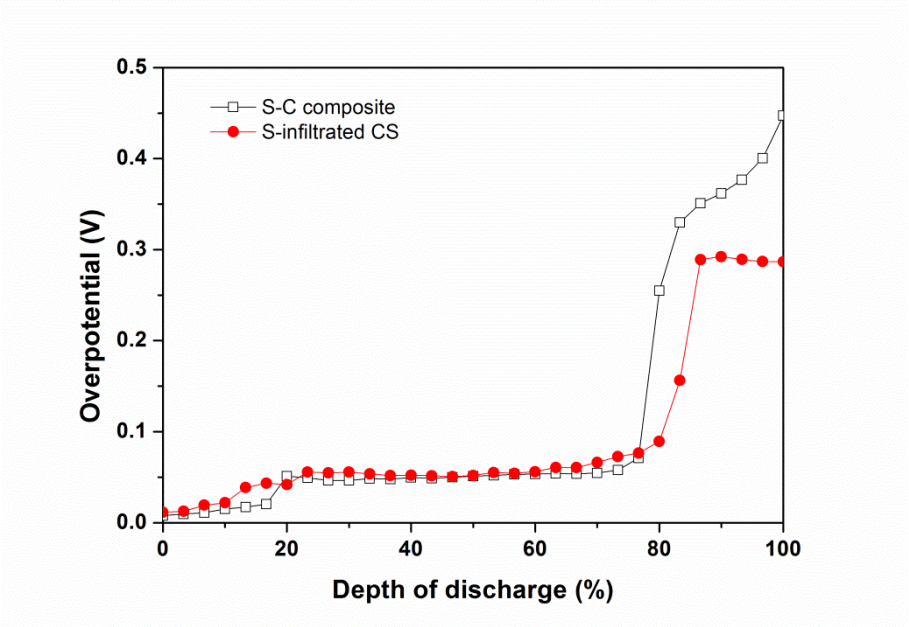

Fig. S8 The variations of overpotential obtained from S-infiltrated CS and S–C composite during the first discharge.

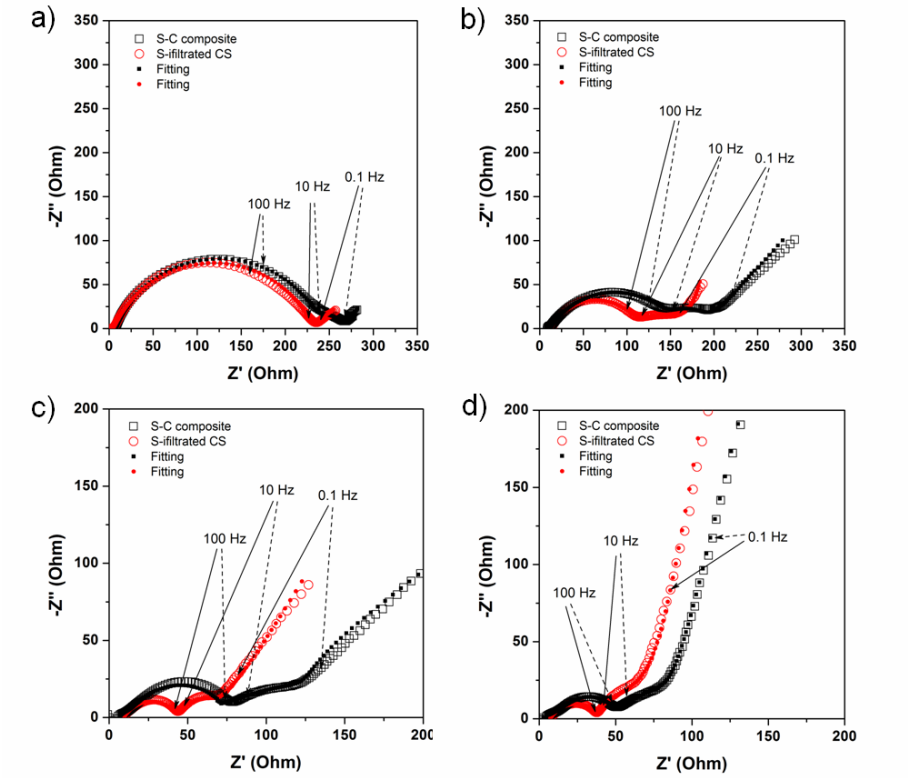

Fig. S9 Impedance spectra of S-infiltrated CS and S–C composite obtained from different depth of discharge; (a) 6.6%, (b) DOD 29.7%, (c) DOD 59.4%, and (d) DOD 89.1%. All components are carefully fitted with the depth of discharge.

This journal is © The Royal Society of Chemistry 2013

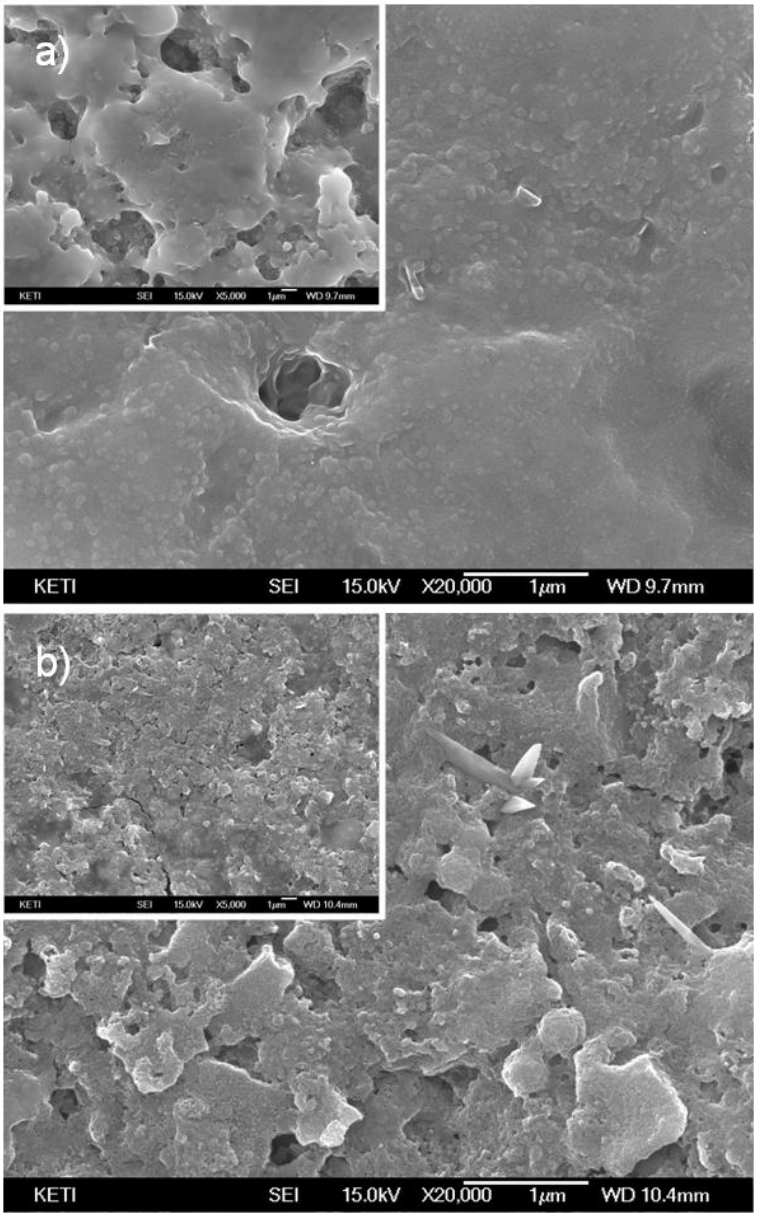

Fig. 10 FESEM images of (a) S-C composite cathode and (b) S-infiltrated CS cathode at different magnifications after 50 cycles.