Supplementary data

High-surface-area α-Fe2O3/carbon nanocomposite: one-step synthesis and its highly reversible and enhanced high-rate lithium storage properties

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Figure S1 shows the TGA curves of HIOC composite and iron lactate precursor. The curve for Iron(II) lactate hydrate indicates the iron lactate precursor losing weight during a multi-step process. The total weight lost is around 70%. Due to the air stable of Fe_2O_3, the carbon content for Sample I, Sample G, Sample B, Sample E, Sample F is calculated to be 0%, 0.6%, 5.3%, 14.7%, and 31.2%, respectively. The sample names are described in Table 1.

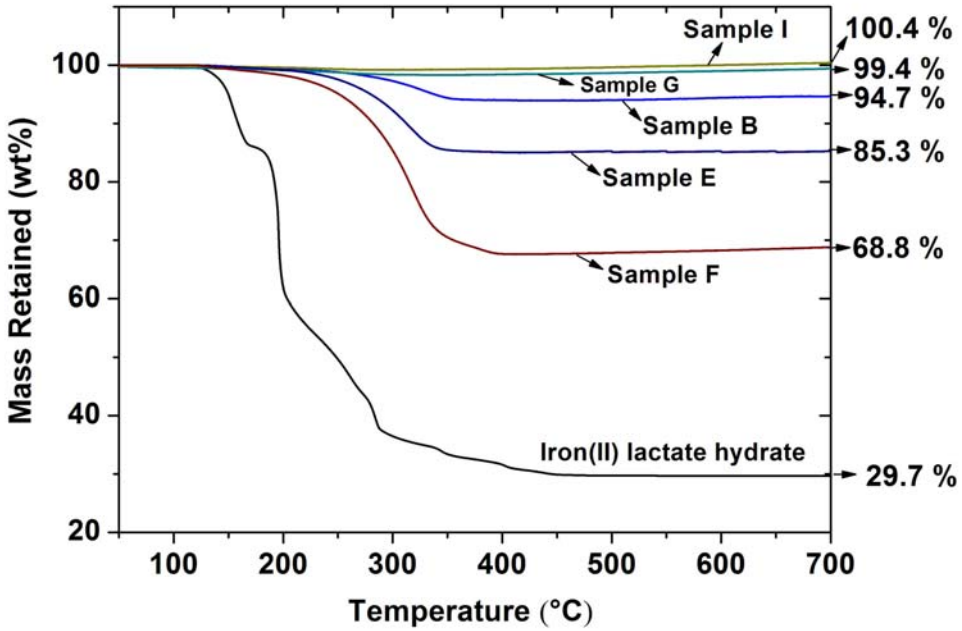

Figure S1. TGA results on different samples with different carbon contents and pure iron lactate hydrate powder. The sample names are described in Table 1.

Fig. S2 shows the energy dispersive x-ray (EDX) spectrum of HIOC composite. The result confirms that the HIOC composite contains the elements Fe, O, and C, indicating the presence of carbon. The element In from the sample holder of the scanning electron microscope (SEM) is also detected.

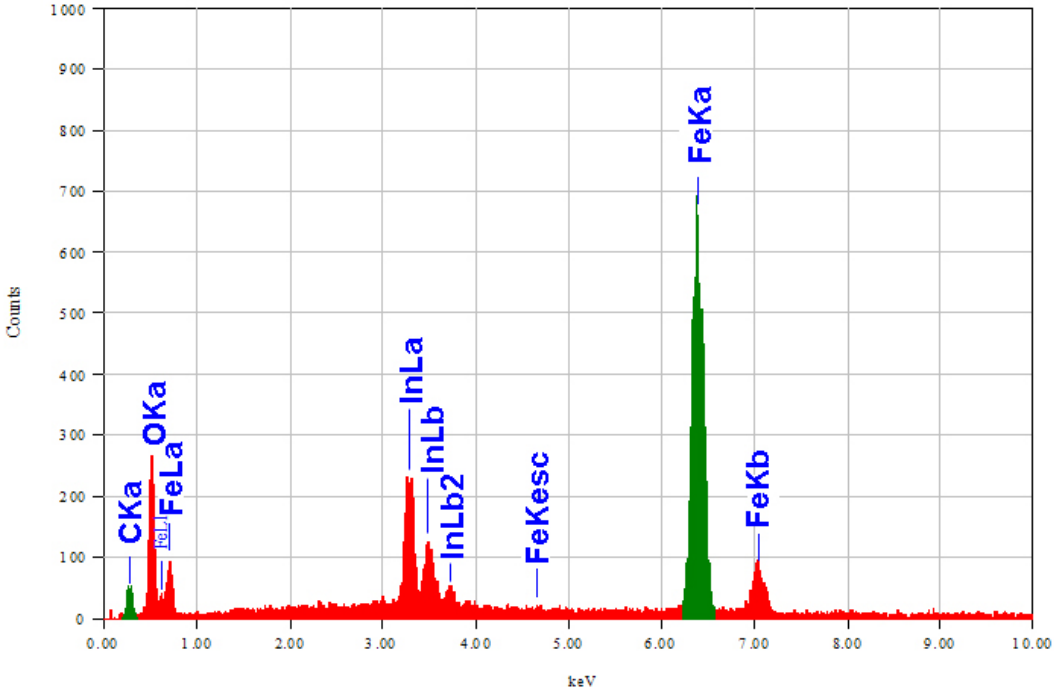

Figure S2. EDX spectrum of HIOC sample.

The HIOC sample was mixed with KBr powder, placed in a sample cup, and measured using a Shimadazu IRPrestige-21 FT-IR spectrometer. KBr was used for the background file. All spectra were measured from 4000 to 500 cm^{-1}, and the number of scans was typically 10, with a resolution of 2 cm^{-1}. A $\nu_{asym(COO)}$ band at ~1600 cm^{-1} and a $\nu_{sym(COO)}$ band at ~1400 cm^{-1} can be observed from Fig. S3. The peak at around 500 cm^{-1} is owing to the vibration of O-Fe-O.

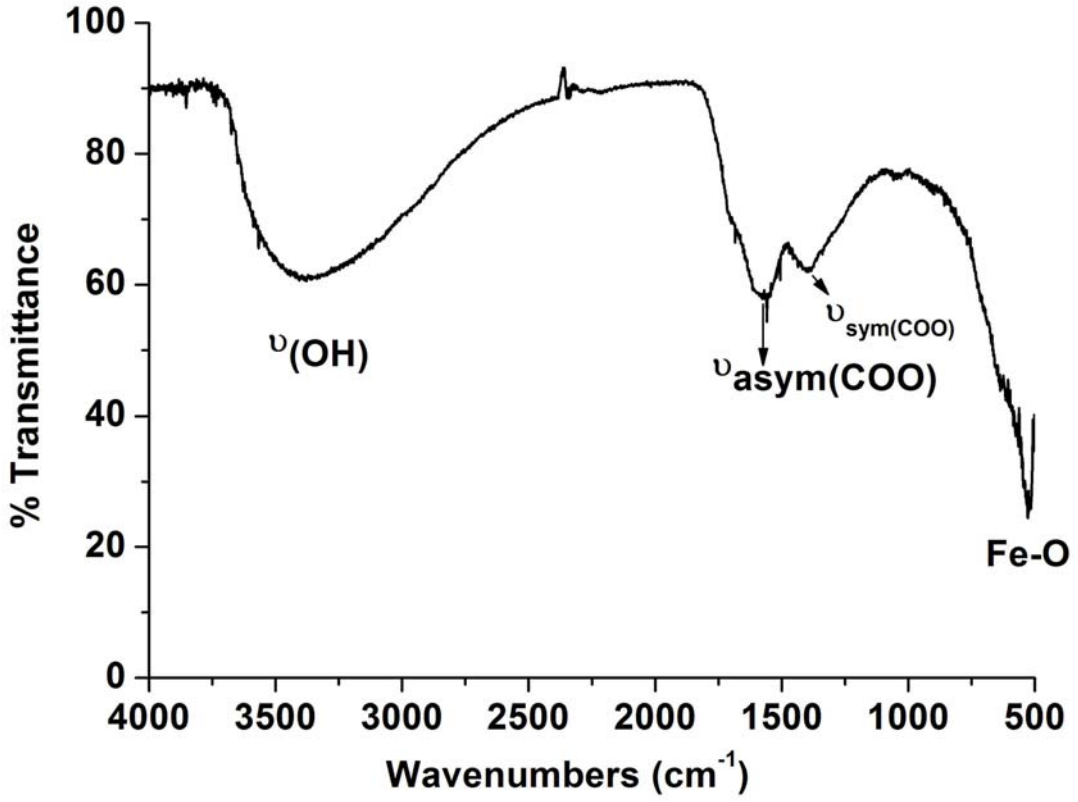

Figure S3. FT-IR spectrum of the HIOC composite.

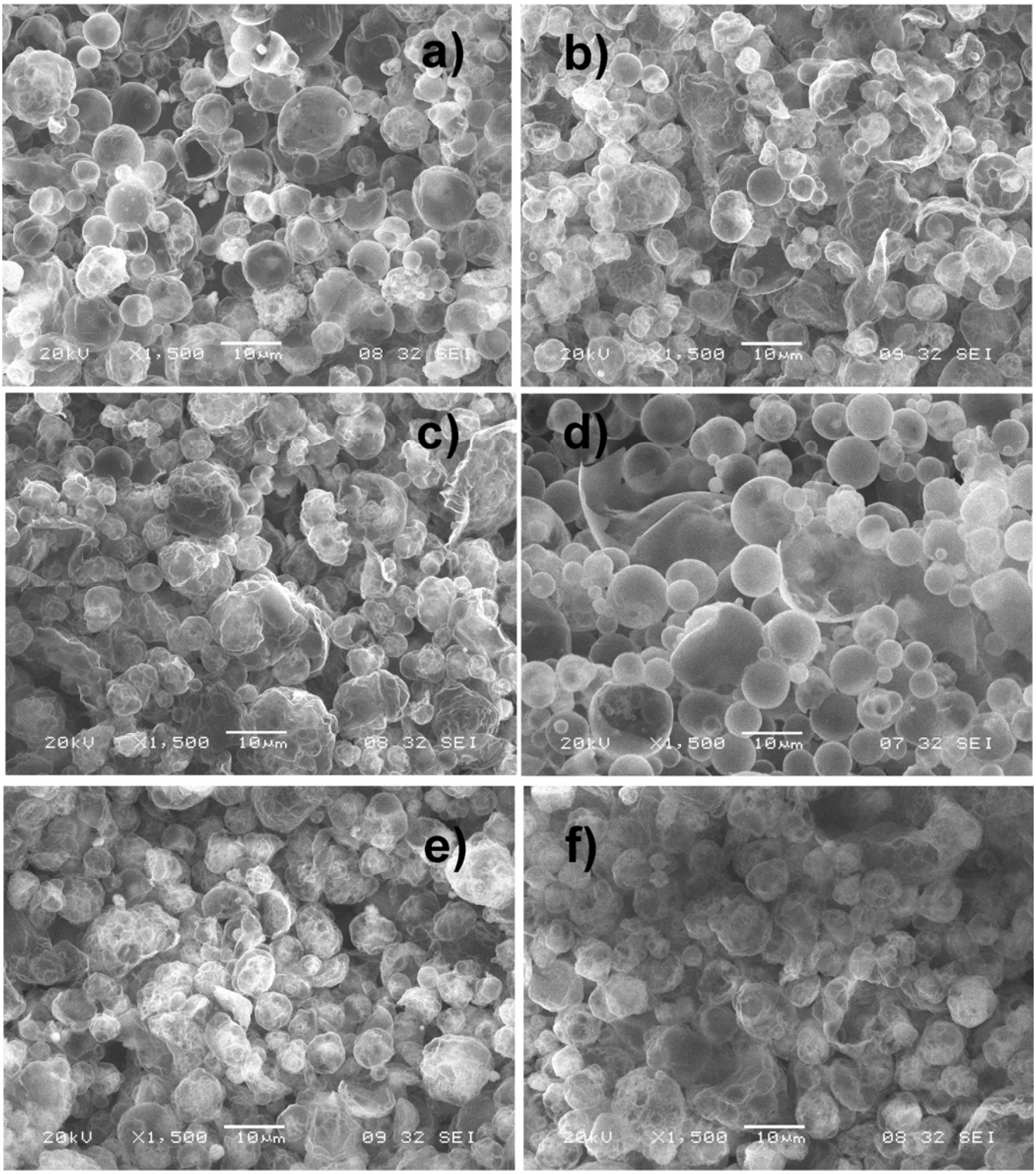

Figure S4. SEM images of a) Sample B, b) Sample C, c) Sample D, d) Sample F, e) Sample G, and f) Sample I. The samples are described in Table S1.

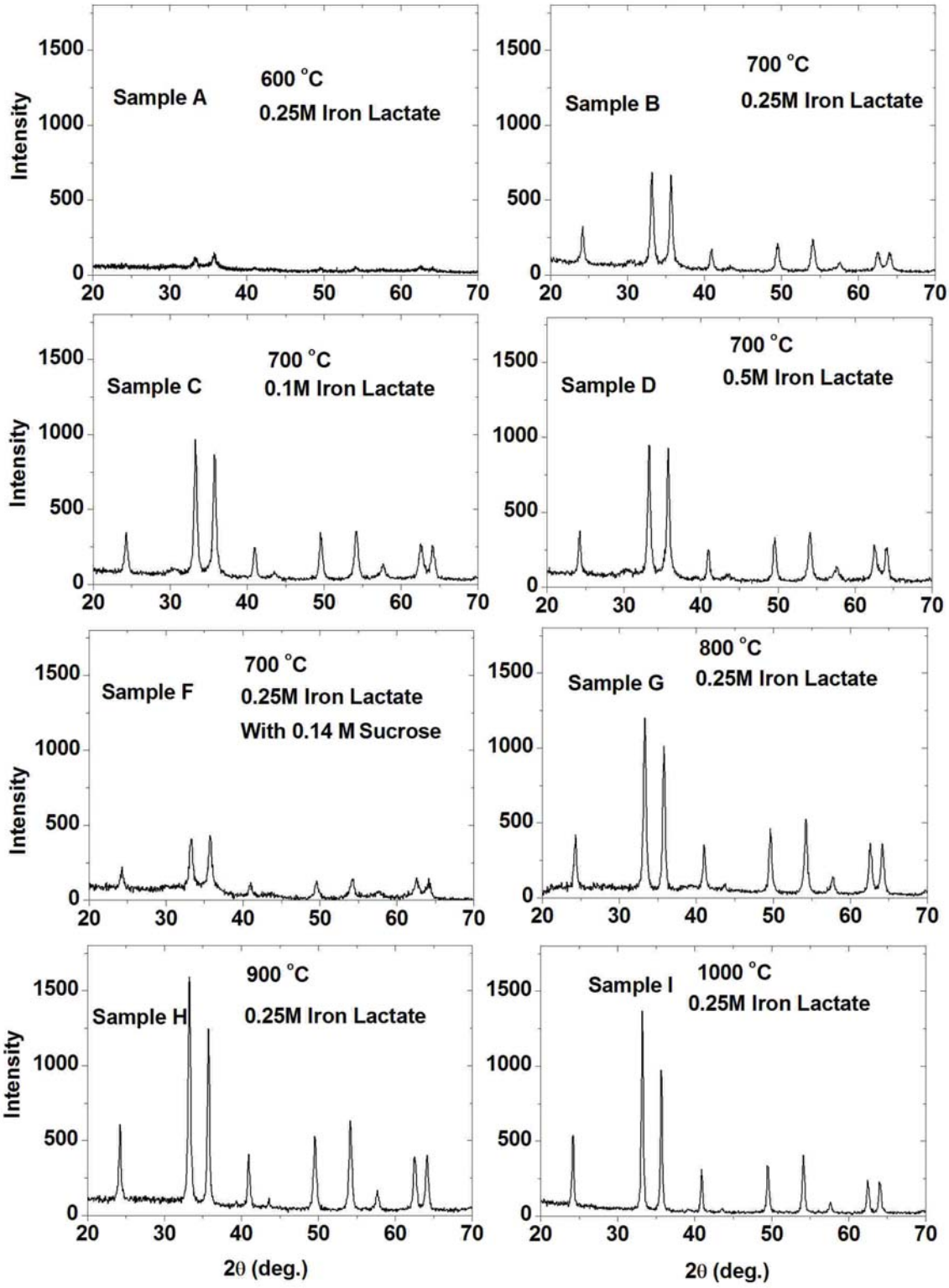

Figure S5. XRD patterns of samples produced at different conditions using spray pyrolysis.