Supporting Information

Nanocrystalline porous α-$LiFeO_2$/C composite -an environmentally friendly cathode for the lithium-ion battery

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Figure S1

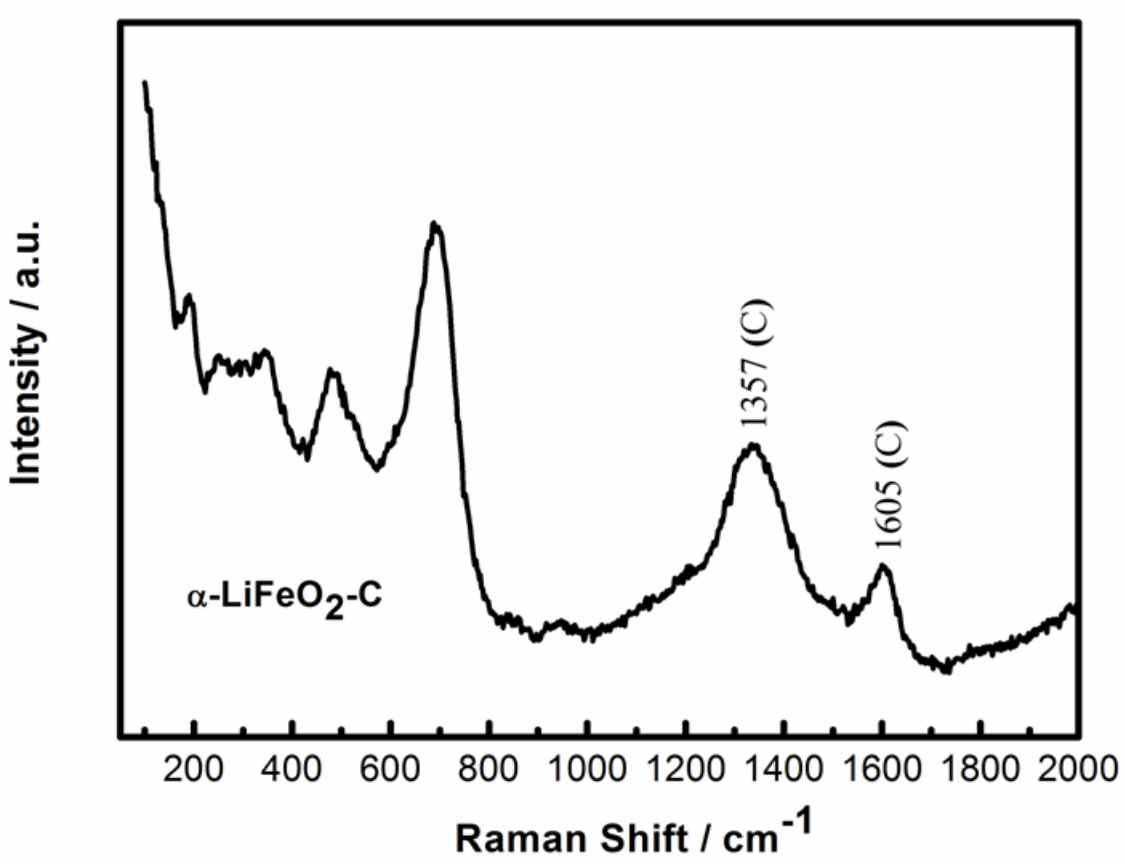

Figure S1. Raman spectrum obtained from α-$LiFeO_2$-C nanocomposite.

In the range of 1000-1800 cm^{-1}, it can be observed that the Raman spectra exhibit a typical characteristic of amorphous carbon, a broad peak located approximately in the range of 1200-1700 cm^{-1} that is usually fitted to two peaks at approximately 1605 cm^{-1} (G band) and 1357 cm^{-1} (D band). [41]

Reference

41 O. Garcia-Zarco, S.E. Rodil , M.A. Camacho-López, *Thin Solid Films,* 2009, **518**, 1493-1497.

Figure S 2

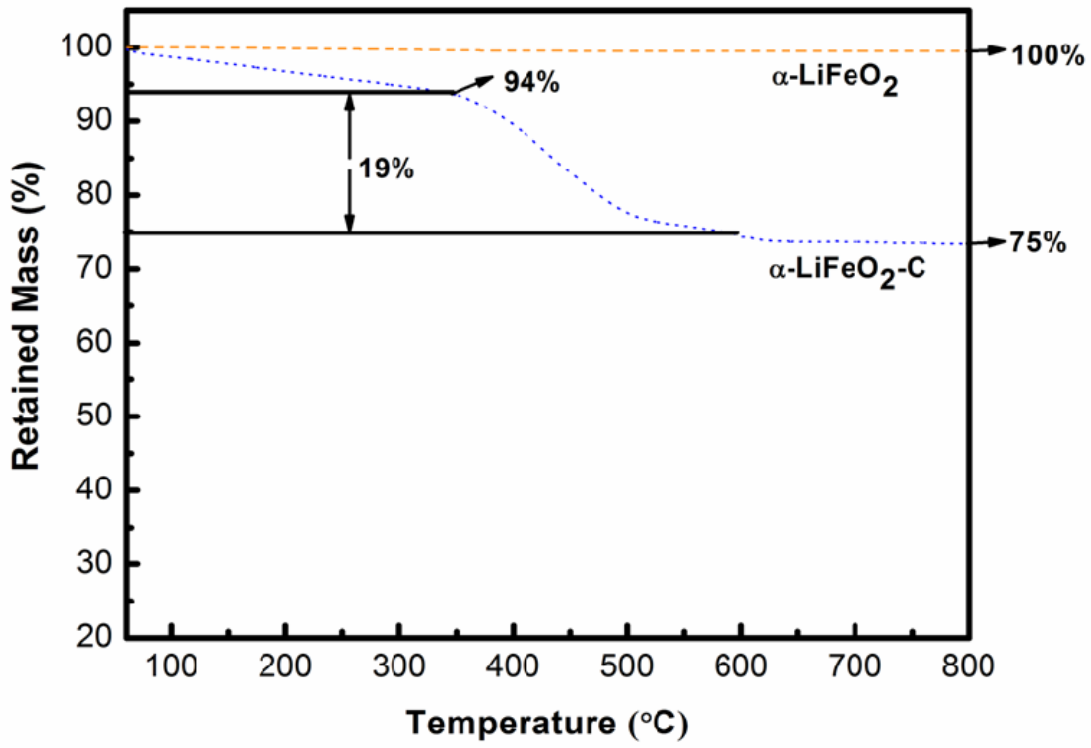

Figure S 2. TGA analysis of α-$LiFeO_2$ and α-$LiFeO_2$-C nanocomposite.

To estimate the amount of amorphous carbon in the α-$LiFeO_2$-C composite, TGA was carried out in air (Figure S 2). As the α-$LiFeO_2$ powders remained stable over the selected temperature range, any weight change is believed to correspond to the oxidation of amorphous carbon.[42] It was estimated that the amount of total weight loss in the composite was approximately 25 wt. %, where ~ 6 wt.% weight loss could be considered as from loss of moisture and volatile organic compounds in the α-$LiFeO_2$-C, starting from 50°C . The remaining amount, ~ 19 wt.%, was attributed to the amorphous carbon produced by the decomposition of malic acid ($C_4H_6O_5$) in the precursor.

Reference

42 S.H. Ng, J. Wang, D. Wexler, S.Y. Chew, H.K. Liu, *J. Phys. Chem. C,* 2007**, 111**, 11131-11138.

Figure S 3

Energy dispersive spectroscopy (EDS) elemental analysis of the α-$LiFeO_2$-C nanocomposite was carried out for the main elements Fe, O, and C. Figure S3 shows agglomerated particles of α-$LiFeO_2$-C nanocomposite (a) together with the mappings of the individual elements Fe, O, and C (b-d), respectively, as indicated by the bright spots.

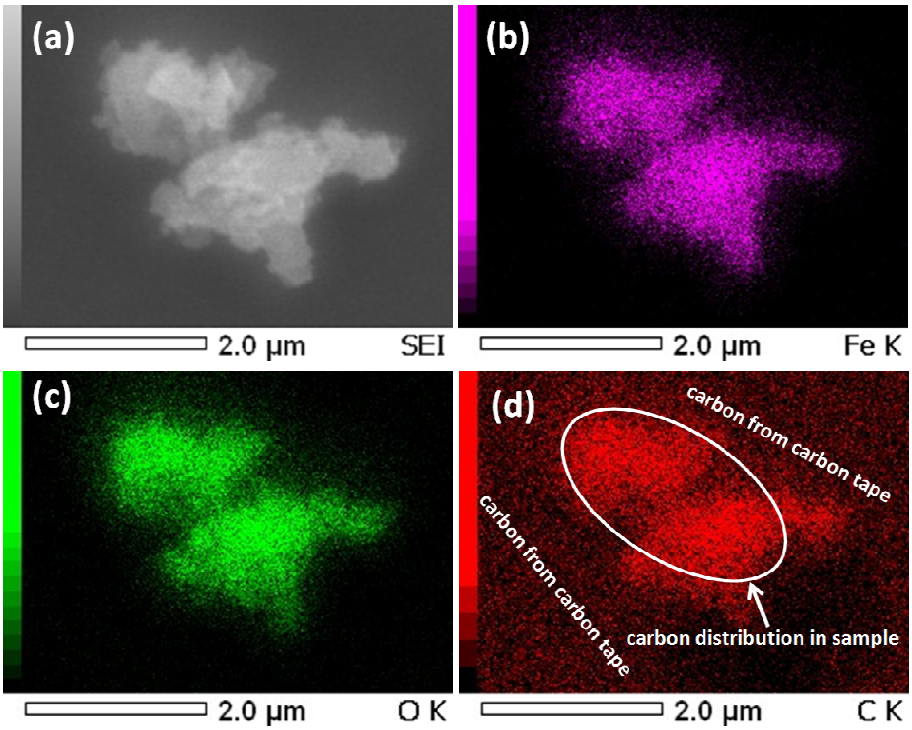

Figure S3. FESEM image of (a) α-$LiFeO_2$-C nanocomposite powders and their corresponding EDS mappings as follows: (b) Fe mapping, (c) O mapping, and (d) C mapping.