

Electronic Supplementary Material (ESI) for Chemical Communications  
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## Supporting Information

### Carbon nanofibres from fructose using light-driven high-temperature spinning disc processing

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#### S1 Method summary

D-Fructose (Fluka AG) was used as a carbon precursor and was dissolved in Polyethylene Glycol-200 (PEG 200) (Sigma-Aldrich) (0.01 g/mL solution). The mixture was then fed onto the spinning disk rotating at 500 rpm at a feed rate of 0.5 mL/s. The products were collected at the bottom of HT-SDP and recycled through the HT-SDP in multiple passes with  $n$ , the number of passes being 1, 2, 3 and 4. Upon completion of the synthetic procedure, the samples were purified by multiple centrifugations in ethanol so as to remove PEG 200.

A 7 kW lamp (Osram XBO 7000W/HS OFR) was installed in the High-Temperature Spinning Disk Processor for achieving a uniform temperature of  $\sim 720^\circ\text{C}$  over a 100-mm diameter spinning reactor disk.

The products were examined by scanning electron microscopy (SEM) using a Zeiss1555 VPSEM. Transmission electron microscopy (TEM), selected area electron diffraction (SAED) patterns, Electron energy loss spectroscopy (EELS) spectrum and elemental mapping analysis of the products were undertaken on a JEOL (JEM-2100F) microscope at an operating voltage of 120 kV. The TEM samples were prepared by ultrasonic dispersion of the products in ethanol.

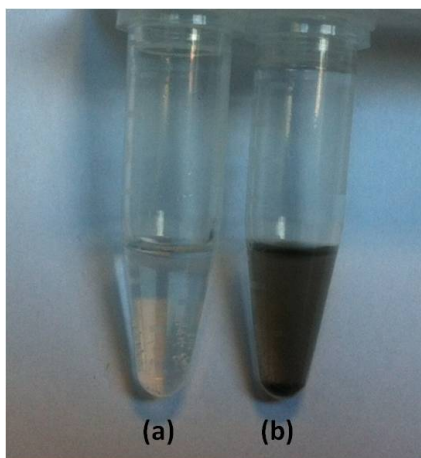
After ultrasonication, a drop of the suspension was placed on a microgrid coated with a continuous carbon film and dried in air.

Raman spectra were also acquired on CNF, Figure 4, using a Witec alpha300R Raman microscope with excitation laser wavelength of 532 nm ( $\leq 5$  mW). Single spectra were recorded with a x40 objective (Numerical Aperture 0.60) at approximately 10 locations with typical integrations times between 20 to 40 seconds.

The FTIR spectra were collected for these samples using Fourier Transform IR spectrometer (PerkinElmer). The number of scans was 20 and the resolution was  $2\text{ cm}^{-1}$ . All spectra were collected in the range of  $4000\text{-}400\text{ cm}^{-1}$ .

### **S2 Photographes of the collected product after heating on HT-SDP**

In order to make sure the carbon products devised from the fructose, the pure PEG 200 has also been fed onto the spinning disk at the same experimental situation with 4 passes. The product has collected into the plastic sample tube, and was washed with ethanol several times in order to remove PEG, Figure S1a. It is obvious that there is no carbon produced in pure PEG 200 solution. Compared with pure PEG 200 solution, we can clearly see that the black product has been produced in fructose solution dissolved in PEG-200 after heated on spinning disk at  $720\text{ }^{\circ}\text{C}$ .

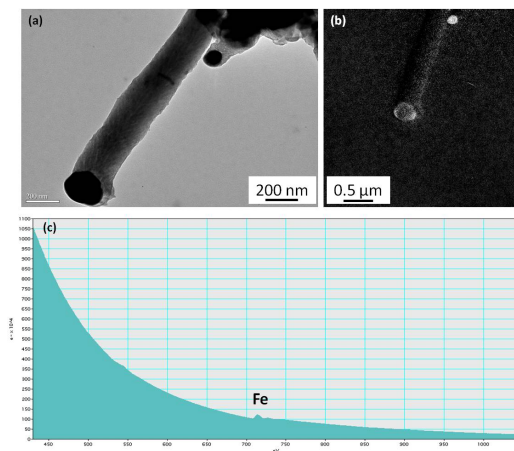


**Figure S1.** Optical images of the products: (a) pure PEG run with 4 passes, and (b) the carbon produced from the fructose dissolved in PEG-200 with 4 passes at  $720\text{ }^{\circ}\text{C}$ .

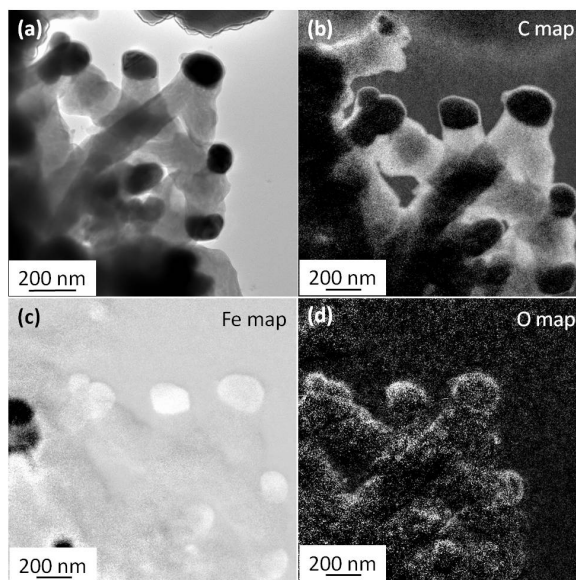
### S3 Electron energy loss spectroscopy (EELS) spectrum and Elemental mapping analysis of carbon nanofibers

In order to identify the metallic particles, EELS spectrum and elemental mapping were carried out on the carbon nanofibers, as shown in Figure S2. The characteristic peak of Fe is easily observed. EFTEM and elemental mapping analysis of iron from the metallic particles indicated that the Fe elements hail from the stainless steel disc.

Moreover, the elemental maps of carbon, oxygen and iron from other CNFs have been obtained, Figure S3. The maps of carbon and oxygen for the CNFs clearly show that the CNFs are derived from an oxygen rich source, but the level of oxygen is very low compared with that of carbon.



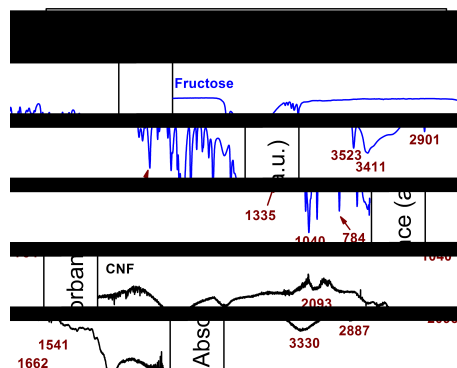
**Figure S2.** (a) TEM image of carbon nanofibers, (b) Iron map obtained from the same area, and (c) EELS spectrum for these carbon nanofibers, indicating that the composed of Iron element in the metallic particle taped in the CNF.



**Figure S3.** (a) TEM image of CNFs, and the elemental maps of (b) carbon, (c) iron and (d) oxygen obtained from the same area.

#### S4 FTIR Characteristics of Carbon nanofibers

FTIR (Fourier transform infrared) spectroscopy was recorded for the CNFs produced using the HT-SDP, along with that of fructose precursor, **Figure S4**. While the spectrum for the former is of low intensity, the fingerprint region corresponding to fructose is absent in the CNFs. The peak at  $3330\text{ cm}^{-1}$  belongs to OH vibrational stretching, that at  $2887\text{ cm}^{-1}$  to CH stretching, then a band of CO and CC stretching is regarded from  $1010\text{ cm}^{-1}$ .



**Figure S4** FTIR spectra of the CNFs and fructose.

#### References

1. M. Ibrahim, M. Alaam, H. El-Haes, A.F. Jalbout, and A. de Leon, *Ecl. Quím., São Paulo*, 2006, **31**, 15-21.