Supporting information

Electron momentum density of boron-doped carbon nano-onions studied by electron energy-loss spectroscopy

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To calculate the sp^2-bonding proportion in the sample, we have used the method proposed by Titantah and Lamoen.[1] This method successfully separates the π* and σ* components of the ELNES of graphite. Then the π* component of graphite is assumed to be transferable to other types of carbon which have contributions in the all ELNES range as shown in Fig. S1 (red line) which is used for the sp^2 percentage calculations. Experimental spectra from highly oriented pyrolytic graphite (HOPG) were used as standard for which the percentage of sp^2 is 100%.

$$sp^2 = \frac{\left[area(\pi^*)/area(total)\right]_{sample}}{\left[area(\pi^*)/area(total)\right]_{100\%\ sp^2\ reference,HOPG}}$$

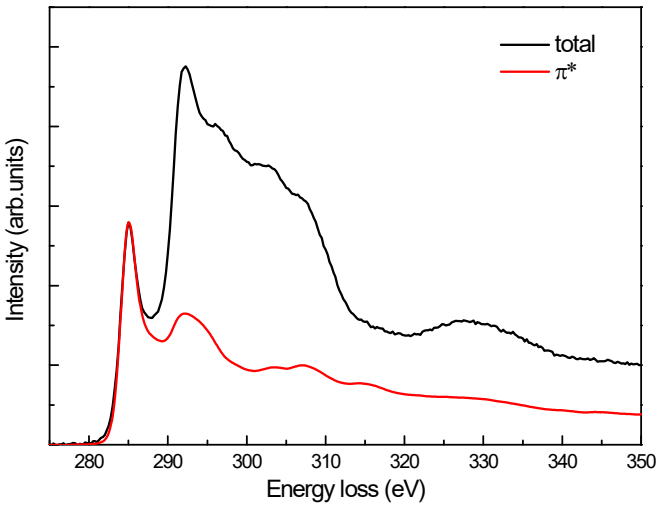

Fig. S1 C-K ELNES (black line) of HOPG recording at the magic angle and the fitting component of π* (red line). The π* component fitted on the basis of experimental π* spectrum of HOPG.[2]

1 J.T. Titantah, D. Lamoen, Technique for the sp(2)/sp(3) characterization of carbon materials: Ab initio calculation of near-edge structure in electron-energy-loss spectra, Phys. Rev. B, **70** (2004) 075115.

2. Z.B. Feng, S. Loffler, F. Eder, D.S. Su, J.C. Meyer, P. Schattschneider, Combined study of the

ground and unoccupied electronic states of graphite by electron energy-loss spectroscopy, J. Appl. Phys. , **114** (2013) 183716.

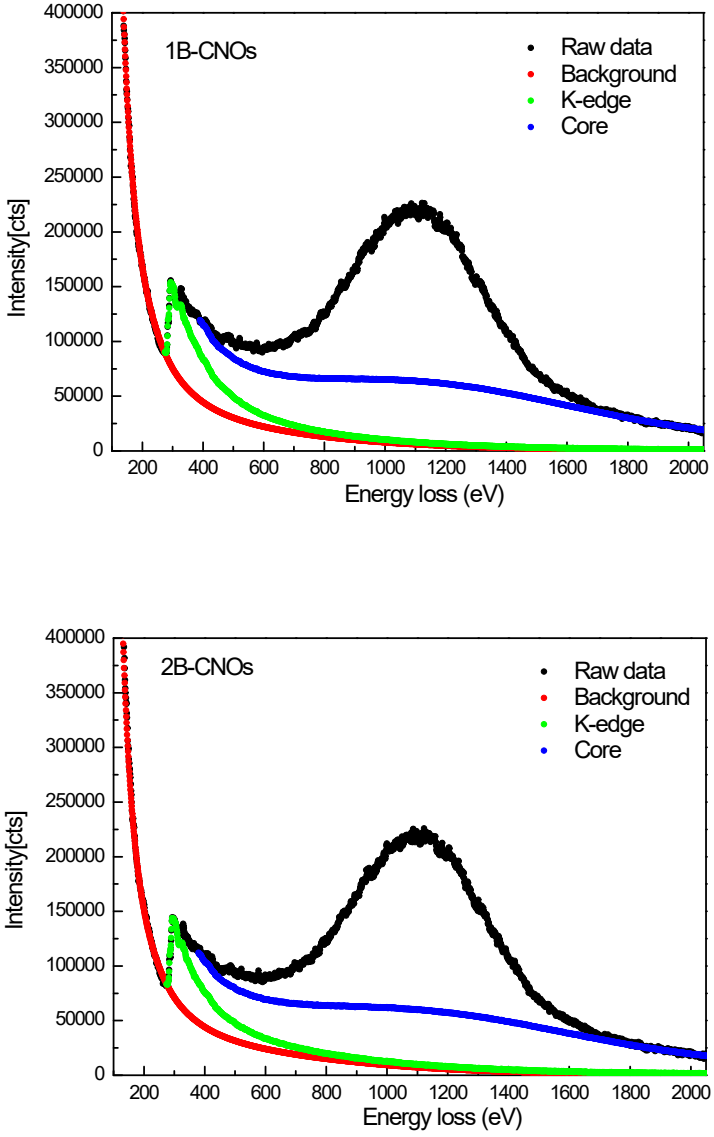

Fig. S2 The raw electron energy-loss spectroscopy data in the range for electron Compton scattering from solids (ECOSS) for 1B-CNOs and 2B-CNOs recorded at scattering angle 75 mrad (black). Also plotted are the simulated background (red) and contributions of K-shell ionization (green) and core-electron Compton scattering (blue).