Supporting Information

Synthesis of nitrogen rich (2D- 1D) hybrid carbon nanomaterial using MnO$_2$ nanorods template for high performance Li-ion battery application

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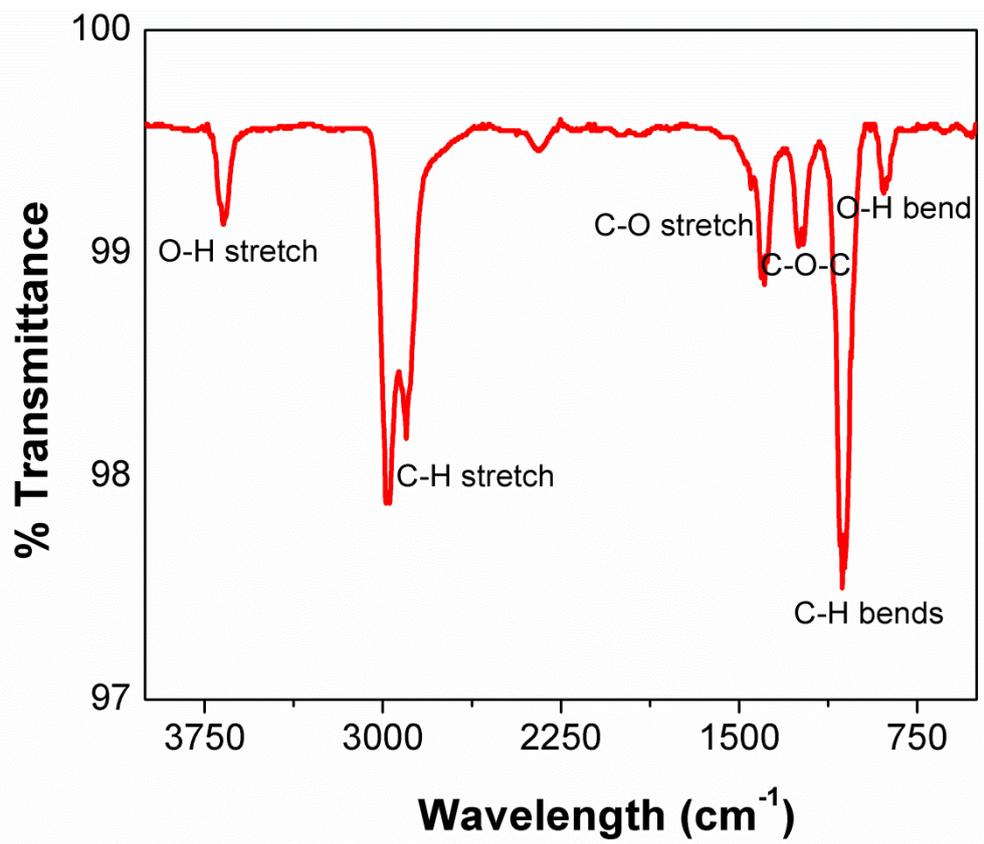
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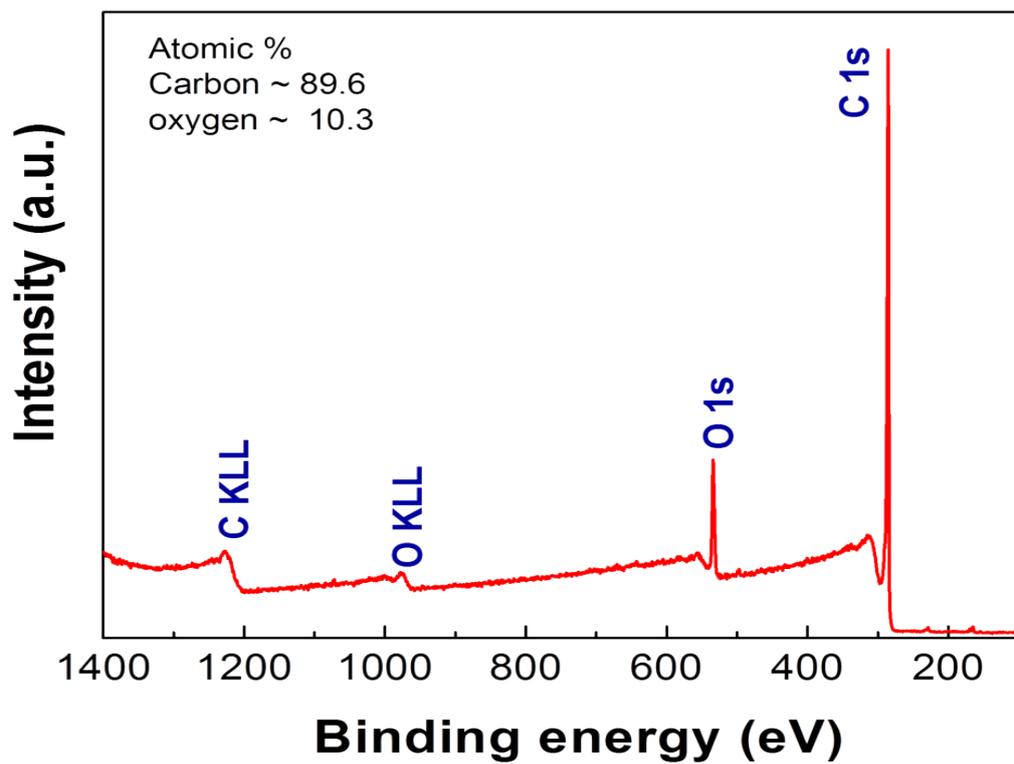
Fig. S1: FTIR spectra of few layer graphene.

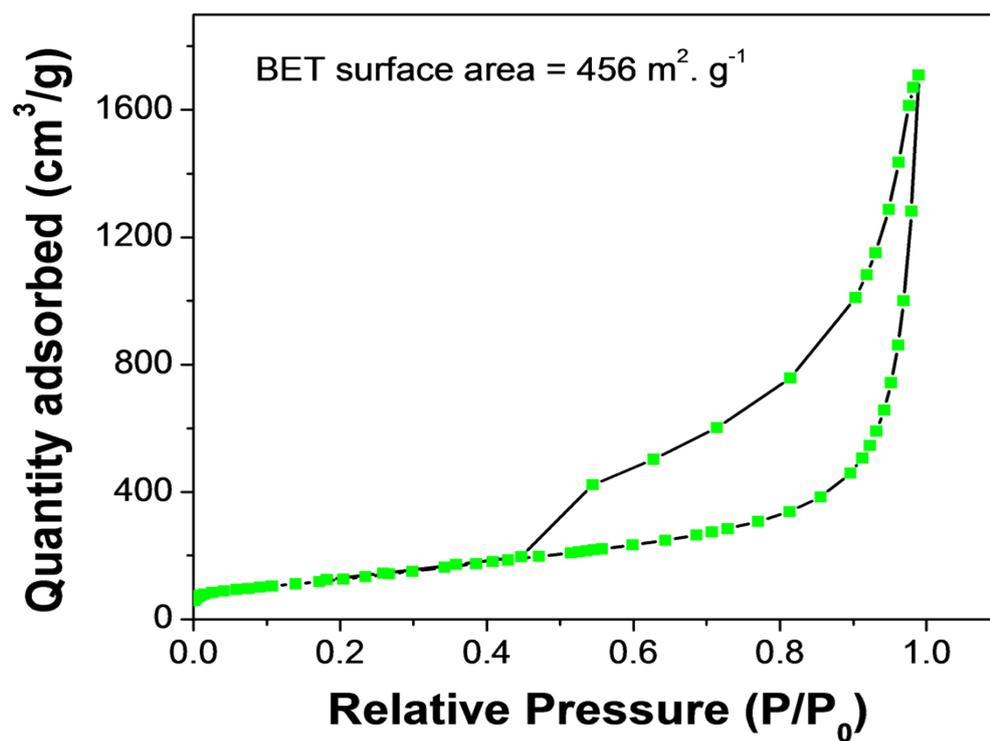Fig. S2: XPS survey spectra of few layer graphene.

BET surface area = 456 $m^2 . g^{-1}$

Fig. S3: Nitrogen adsorption-desorption isotherm of few layer graphene (FLG). BET surface area of the FLG = 456 $m^2.g^{-1}$
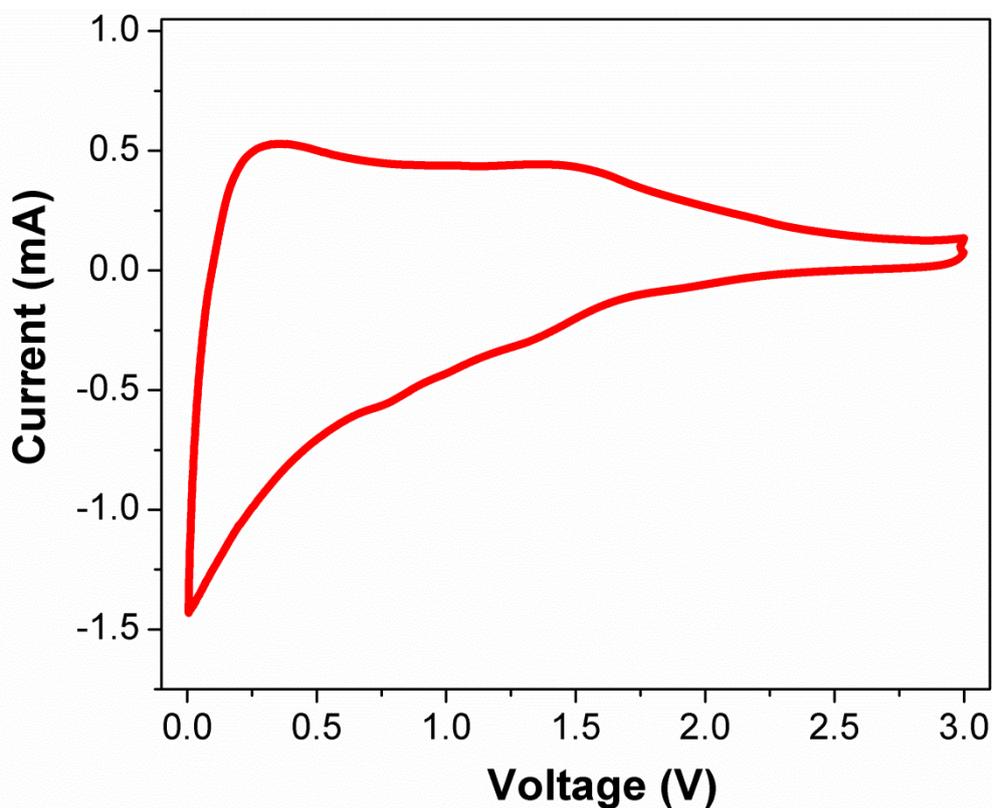
Fig. S4: The first cycle CV curve of the cell with N-(FLG-CN) electrode material at the scan rate of 0.05 mV s^{-1}.

First cycle CV analysis between 0.01 and 3 V with a scan rate of 0.05 mV s^{-1} for the N doped (FLG-CN) hybrid nanocomposite electrode has been shown in Fig.S4.

The first CV curve of N doped (FLG-CN) electrode exhibits two cathodic peaks at around 1.5- 1.2 V and 0.9 - 0.6 V correspond to the reduction of different oxygen functional groups and the decomposition of electrolyte and subsequent formation of a solid electrolyte interphase (SEI). The third cathodic peak nearer to 0.01 V is attributed to the Li$^+$ intercalation into the carbon nanomaterial. The two broad anodic peaks at about 0.2–0.6 V and 1.2–1.7 V are ascribed to Li-extraction from N doped (FLG-CN) electrode material.
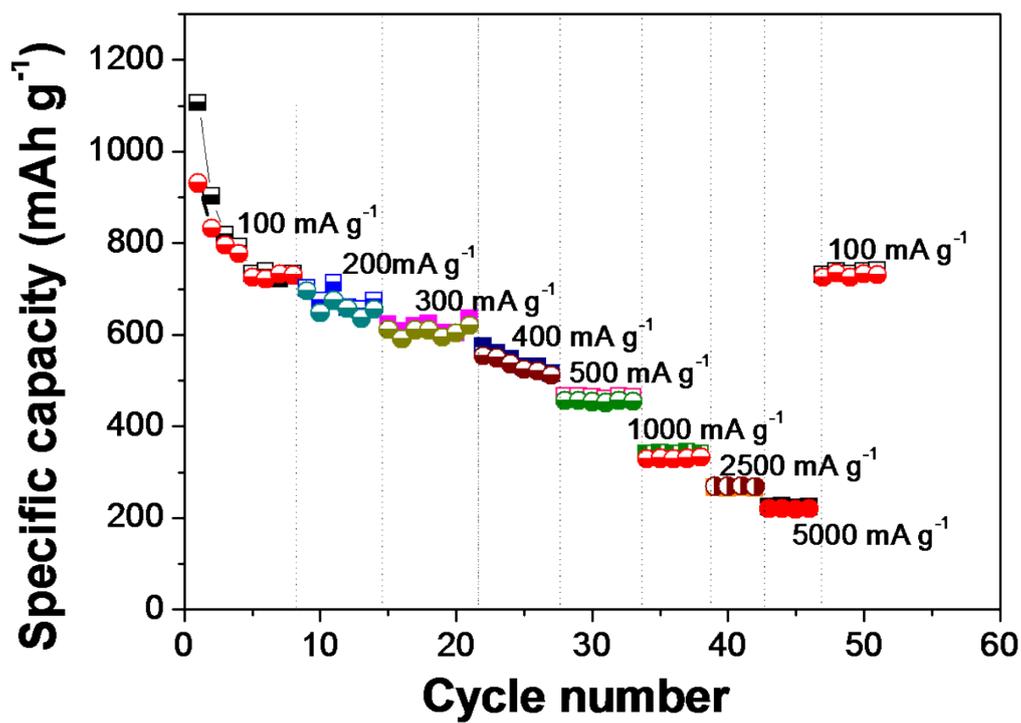
Fig. S5: Rate capability of the cell with N doped (FLG-CN) as anode material charged and discharged at various current rates from 100 mA g^{-1} to 5000 mA g^{-1}.