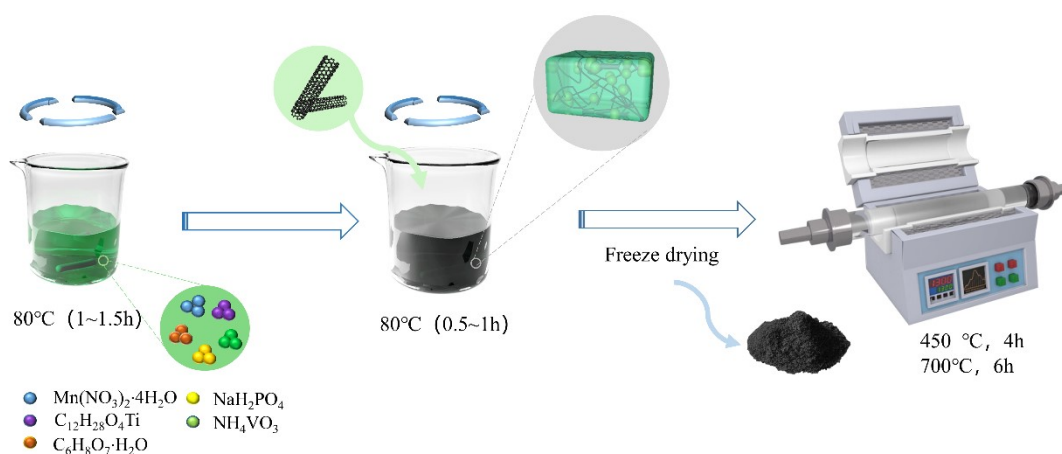# Supplementary Material

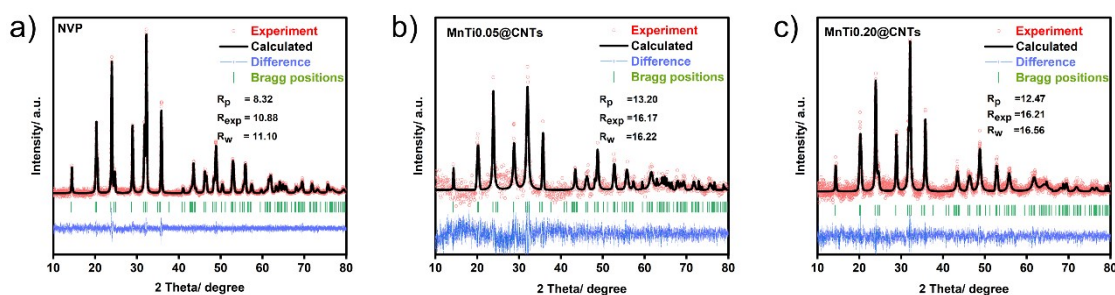**Fig.S1** Graphic synthesis path of $Na_3V_{2-x}Mn_xTi_x(PO_4)_3$/C@CNTs(x=0.05, 0.15, 0.20).

Fig.S2 (a) Rietved refined XRD patterns of MnTi0.15@CNTs. (b) Rietved refined XRD patterns

of MnTi0.20@CNTs. (c) Rietved refined XRD patterns of NVP.

Table.S1 Chemical compositions of all samples.

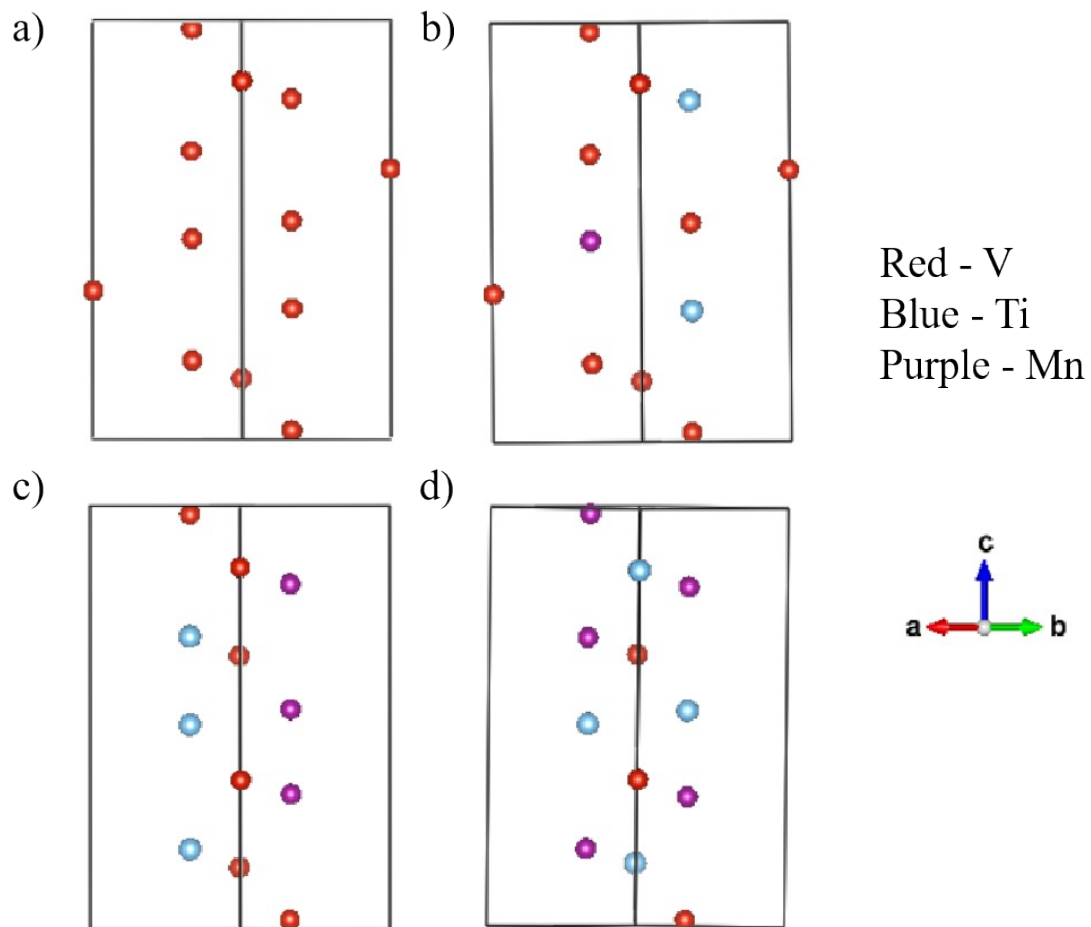| Sample name	Target composition	Measured composition
NVP	$Na_3V_2(PO_4)_3$	$Na_{2.99}V_{2.00}(PO_4)_{2.99}$
MnTi0.05@CNTs	$Na_3V_{1.95}Mn_{0.05}Ti_{0.05}(PO_4)_3$@CNTs	$Na_{2.98}V_{1.94}Mn_{0.04}Ti_{0.04}(PO_4)_3$@CNTs
MnTi0.15@CNTs	$Na_3V_{1.85}Mn_{0.15}Ti_{0.15}(PO_4)_3$@CNTs	$Na_{2.99}V_{1.84}Mn_{0.14}Ti_{0.14}(PO_4)_3$@CNTs
MnTi0.20@CNTs	$Na_3V_{1.80}Mn_{0.20}Ti_{0.20}(PO_4)_3$@CNTs	$Na_{2.98}V_{1.78}Mn_{0.19}Ti_{0.18}(PO_4)_{2.99}$@CNTs

Fig.S3 The model of structures for all samples by DFT calculation

Table.S2 The crystal cell parameters of NVP, MnTi0.05@CNTs, MnTi0.15@CNTs and MnTi0.20@CNTs samples obtained from DFT calculation.

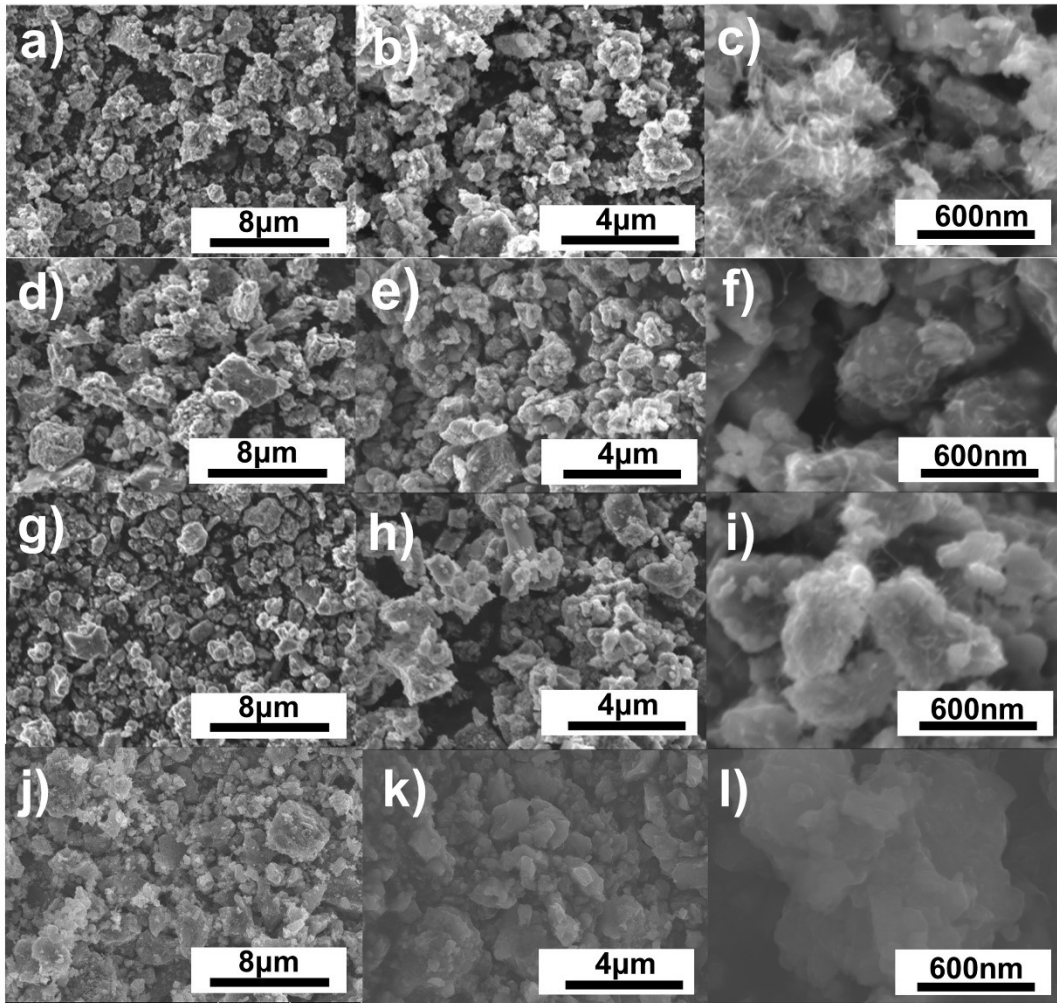| Sample	a/ Å	c/ Å	V/ Å³
NVP	8.807	21.40	1436.77
MnTi0.05@CNTs	8.824	21.47	1446.94
MnTi0.15@CNTs	8.859	21.56	1460.94
MnTi0.20@CNTs	8.879	21.60	1468.12

Fig.S4 SEM images of MnTi0.05@CNTs (a-c) MnTi0.15@CNTs. (d-f) MnTi0.20@CNTs. (g-i)
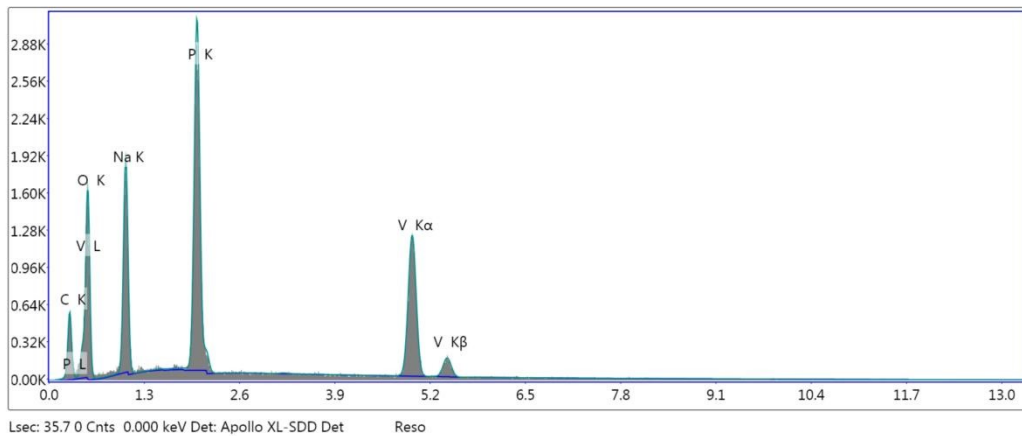
NVP (j-l) at the magnifications of 5k,10k and 50k.

Lsec: 35.7 0 Cnts 0.000 keV Det: Apollo XL-SDD Det   Reso
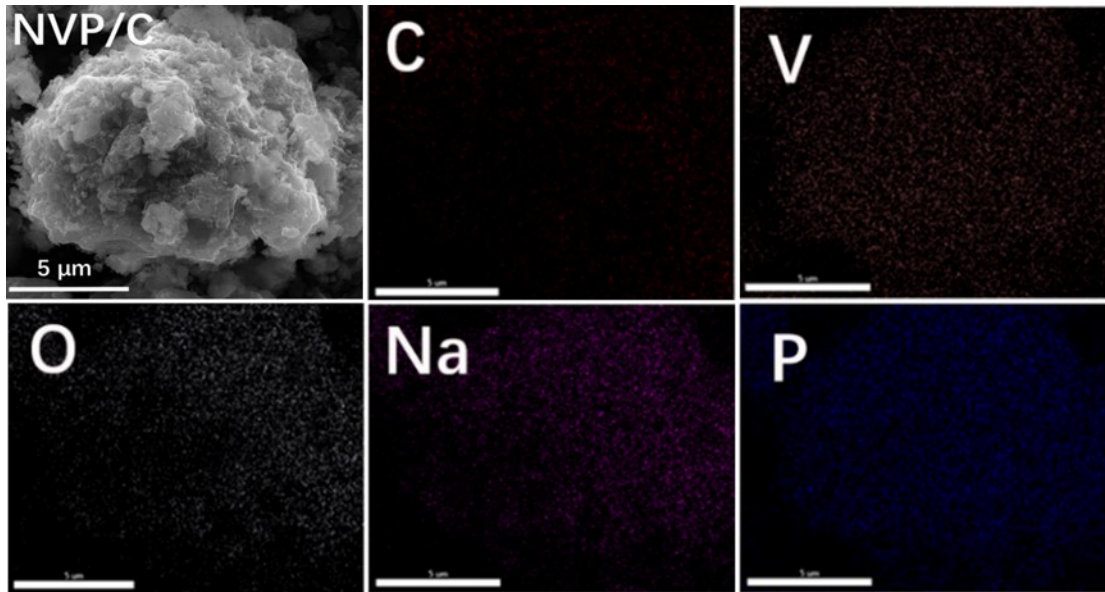
Fig.S5 EDX spectrum of NVP/C sample.

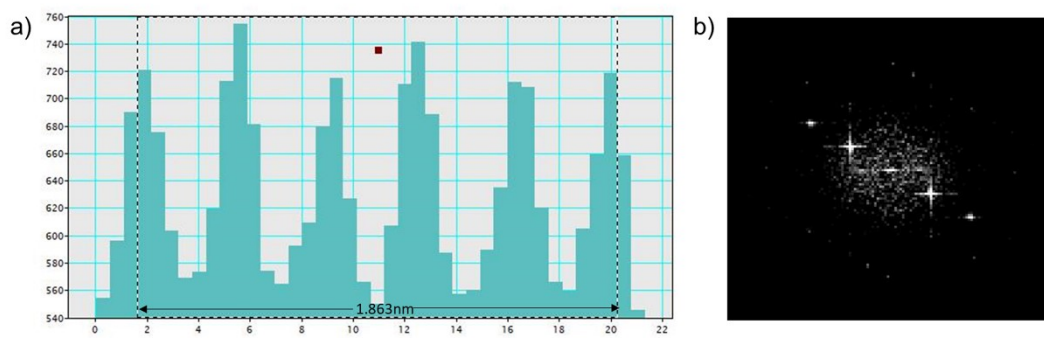**Fig.S6** Mapping images of undoped NVP/C sample.

Fig.S7 (a) The distribution image of lattice spacing of MnTi0.15@CNTs. (b) The fast flourier
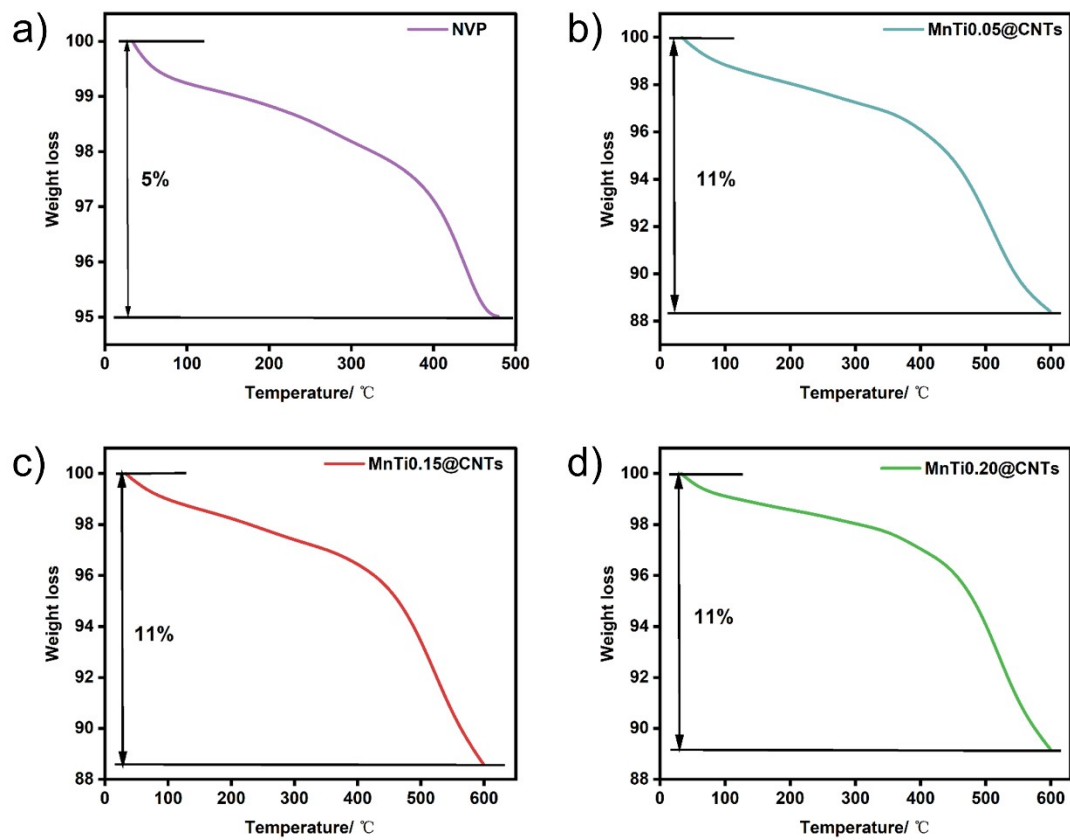
transform images (FFT) of MnTi0.15@CNTs.

Fig.S8 The TG spectrum of NVP/C (a), MnTi0.05@CNTs (b), MnTi0.15@CNTs (c) and MnTi0.20@CNTs (d).
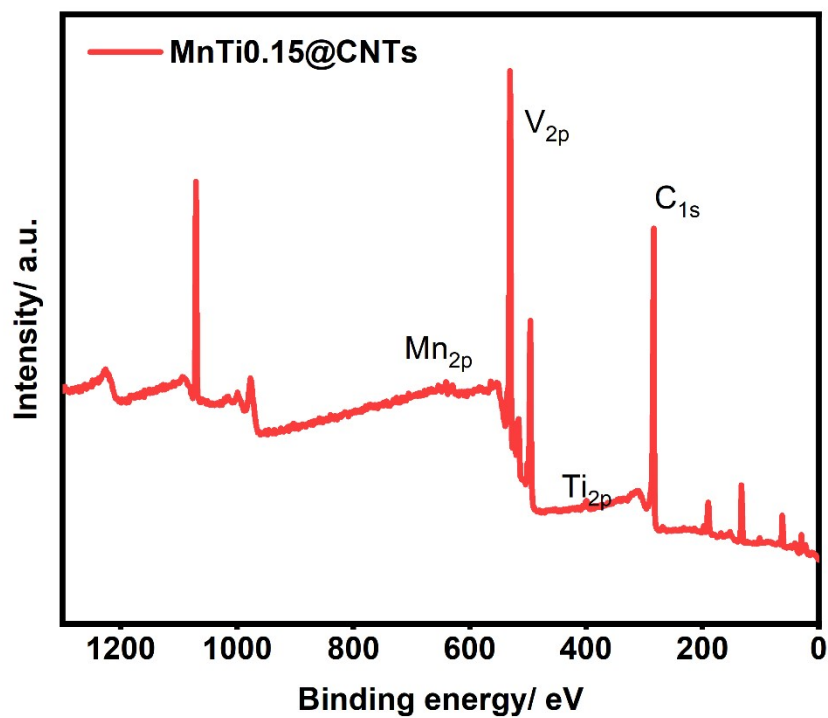
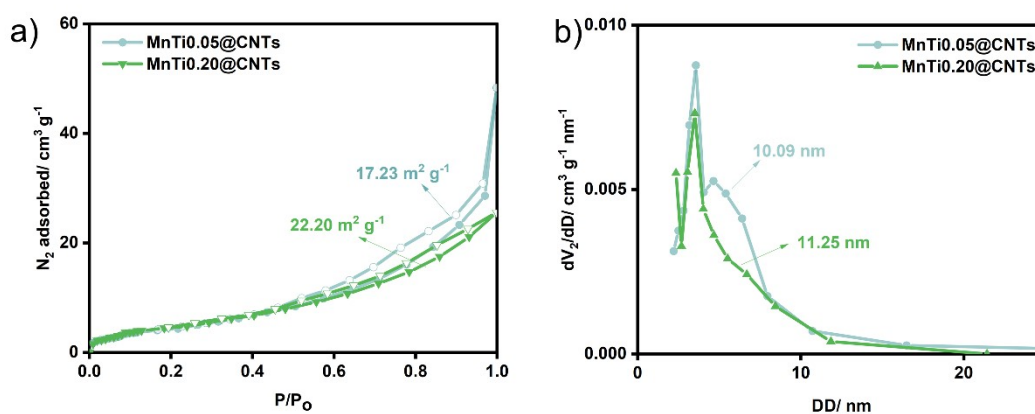**Fig.S9** XPS full spectra of MnTi0.15@CNTs.

Fig.S10 (a) Isotherm of MnTi0.05@CNTs and MnTi0.20@CNTs. (b) Pore volume-pore size
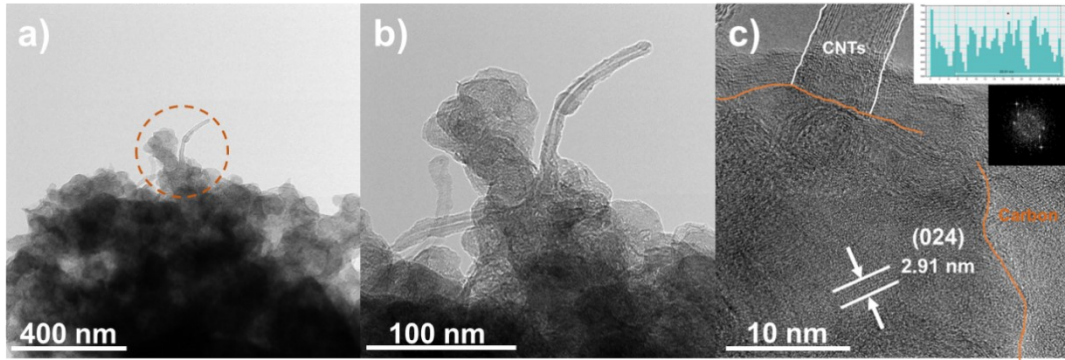
distribution curve of MnTi0.05@CNTs and MnTi0.20@CNTs.

Fig.S11 TEM images of MnTi0.15@CNTs after 1000 cycles at 90C. The insert images in c are the distribution image of lattice spacing and the fast flourier transform images (FFT) of MnTi0.15@CNTs.
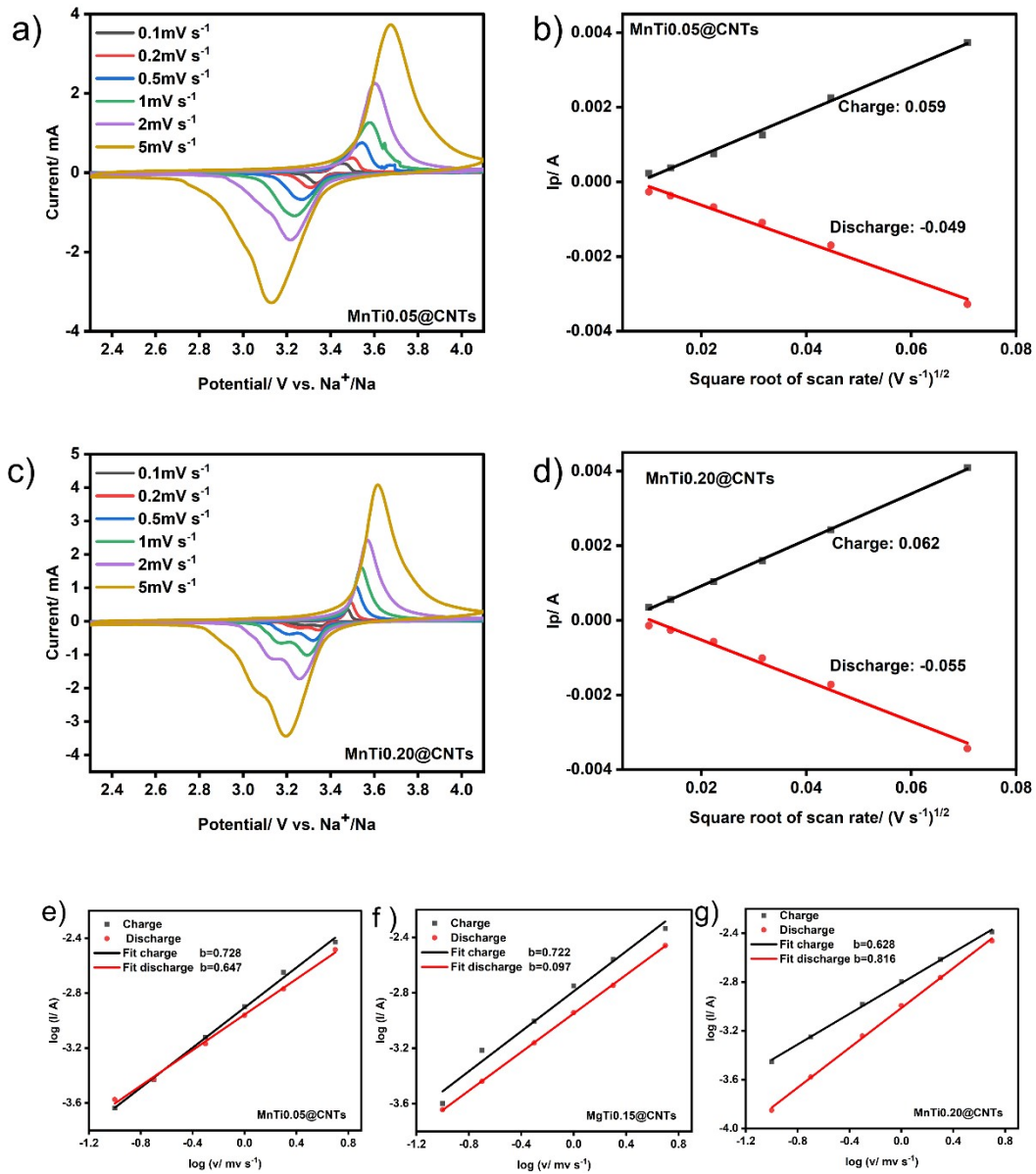
Fig.S12 (a, c) CV curve of MnTi0.05@CNTs and MnTi0.05@CNTs at different scanning speeds, include 0.1, 0.2, 0.5, 1, 2 and 5 mV s^{-1}. (b, d) The linear fitting plot of the peak value. (e-f) Linear fitting graph after taking the logarithm of sweep speed and current of MnTi0.05@CNTs, MnTi0.15@CNTs and MnTi0.20@CNTs.
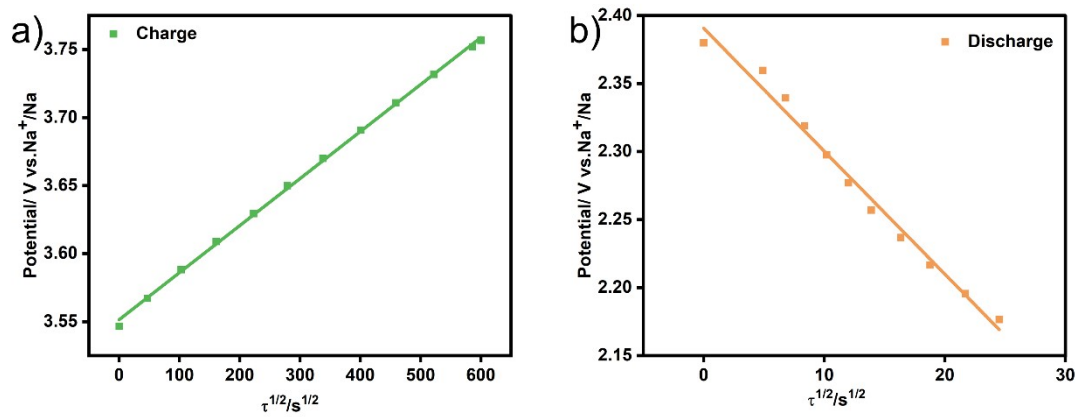
Fig.S13 Corresponding linear behavior of potential against $\tau^{1/2}$ in (a) Charge and (b) Discharge

process.