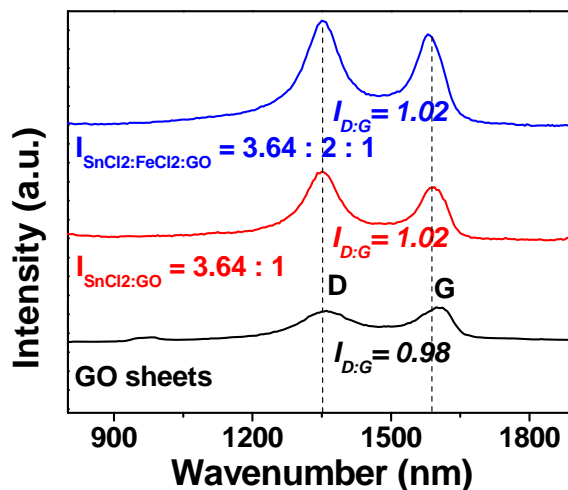# Supporting information



Figure S1 Raman spectra of GO sheets (black curve), samples prepared with a precursor weight ratio of $SnCl_2$: GO = 3.64 : 1 (red curve), and $SnCl_2$: $FeCl_2$: GO = 3.64 : 2: 1 (blue curve). The intensity ratio between D band and G band, $I_{D:G}$ are 0.98, 1.02 and 1.02 for GO sheets (black curve), sample prepared with $SnCl_2$: GO (red curve) and sample prepared with $SnCl_2$: $FeCl_2$: GO (blue curve), respectively.
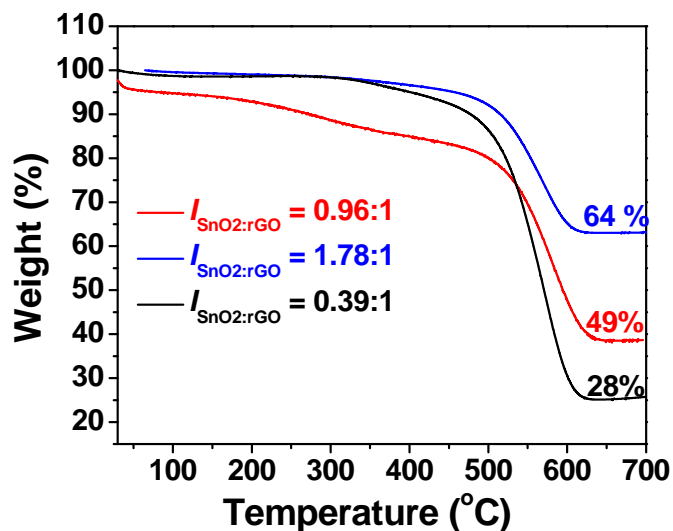
Figure S2 Thermogravimetry analyses (TGA) of SnO_2/rGO composite nanostructures prepared with different precursor weight ratios. The calculated weight ratio of SnO_2 and rGO ($I_{SnO2:rGO}$) are indicated in the plot, which is also summarized in Table SI. The measurements were carried out at a heating rate of 10 K/min in air. The weight loss before 100 °C was attributed to the loss of water. Here, 28%, 49% and 64% are the weight percentage of residual samples (SnO_2).
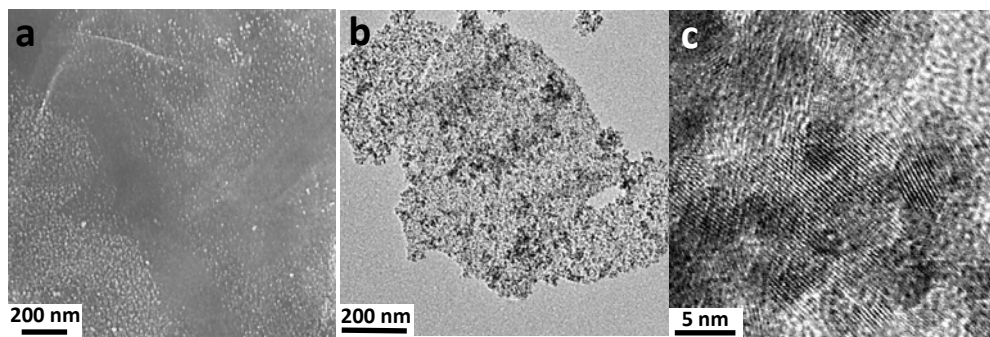
Figure S3 (a) FESEM, (b) TEM and (c) HRTEM images of SnO_2/rGO sample with $I_{SnO2:rGO}$ = 1.78 : 1
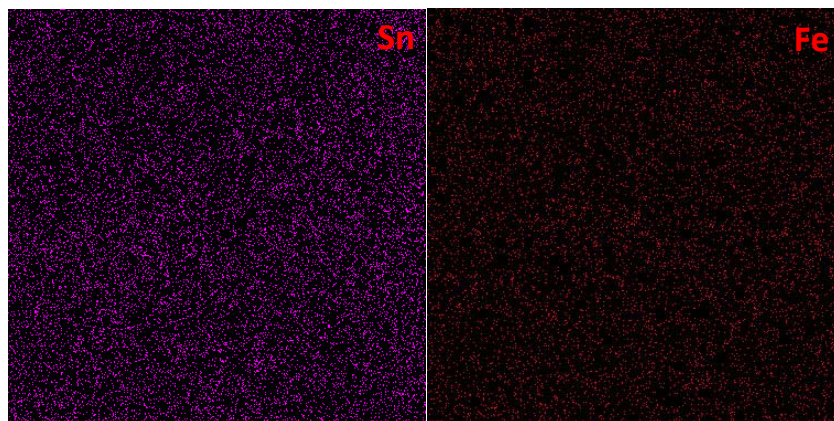
**Figure S4** Elemental mapping images of composite nanostructures prepared from $SnCl_2$, $FeCl_2$ and GOs *with* $I_{SnCl2:FeCl2:GO}$ = 3.64 : 2 : 1. It indicated the homogeneous distribution of Sn and Fe in the composite nanostructure.
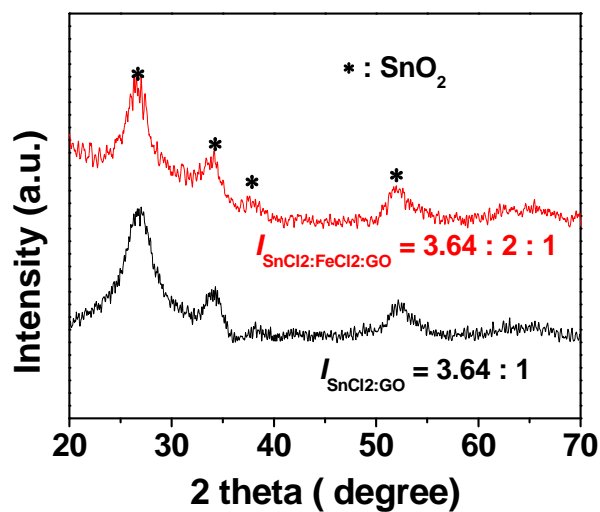
Figure S5 XRD patterns of samples prepared from $SnCl_2$ and GOs (black curve); $SnCl_2$, $FeCl_2$ and GOs (red curve). In the XRD pattern of sample prepared from $SnCl_2$, $FeCl_2$ and GOs (red curve), there is no detectable Fe containing phase except for SnO_2.
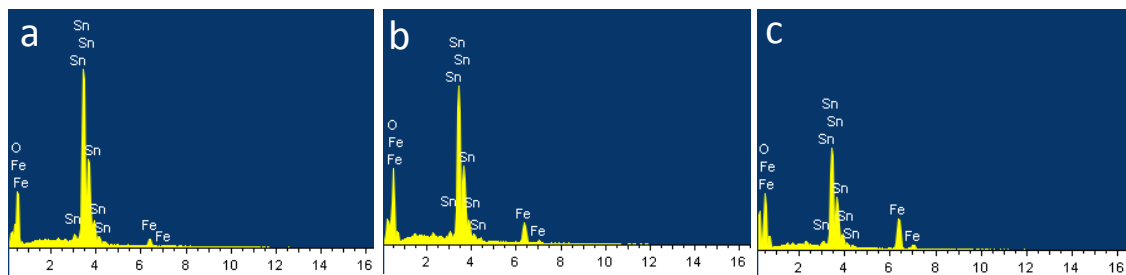
Figure S6 EDX images of samples annealed at 150 °C for 30 min under Ar atmosphere. The samples are prepared from $SnCl_2$, $FeCl_2$ and GOs with (a) $I_{SnCl2:FeCl2:GO} = 3.64 : 2 : 1$, (b) $I_{SnCl2:FeCl2:GO} = 1.82 : 2 : 1$ and (c) $I_{SnCl2:FeCl2:GO} = 0.78 : 2 : 1$.
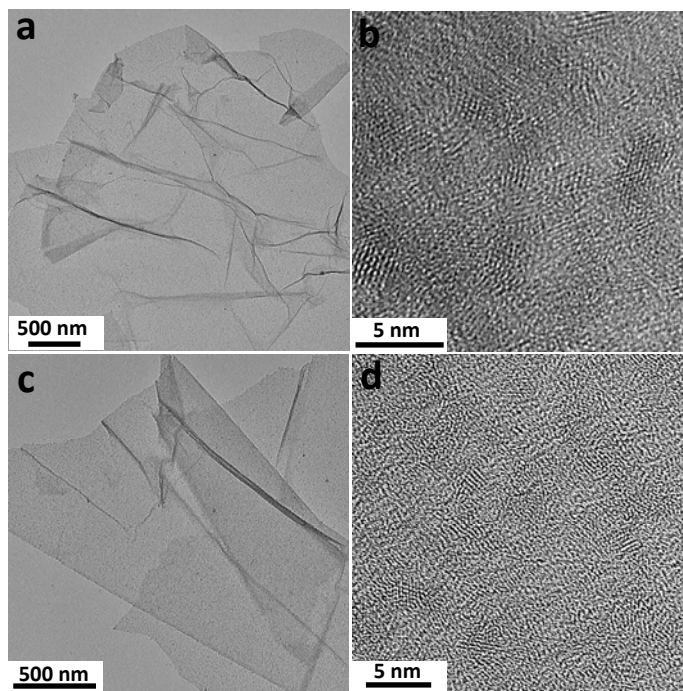
**Figure S7** (a) TEM and (b) HRTEM images of SnO$_2$-Fe$_2$O$_3$/rGO sample with $I_{SnO2:Fe2O3:rGO}$ = 2.82 : 1 : 5.27; (c) TEM and (d) HRTEM images of SnO$_2$-Fe$_2$O$_3$/rGO sample with $I_{SnO2:Fe2O3:rGO}$ = 1.32 : 1 : 1.68.
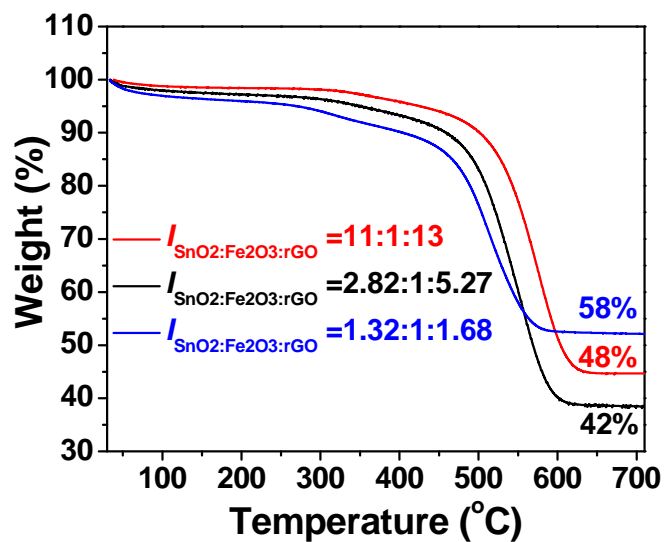
Figure S8 Thermogravimetry analyses (TGA) of SnO_2-Fe_2O_3/rGO composite nanostructures prepared with different precursor weight ratios. The calculated weight ratio of SnO_2, Fe_2O_3 and rGO ($I_{SnO2:Fe2O3::rGO}$) are indicated in the plot, which is also summarized in Table SI. The measurements were carried out at a heating rate of 10 K/min in air. The weight loss before 100 °C was attributed to the loss of water. Here, 42%, 48% and 58% are the weight percentage of residual samples (SnO_2 and Fe_2O_3).
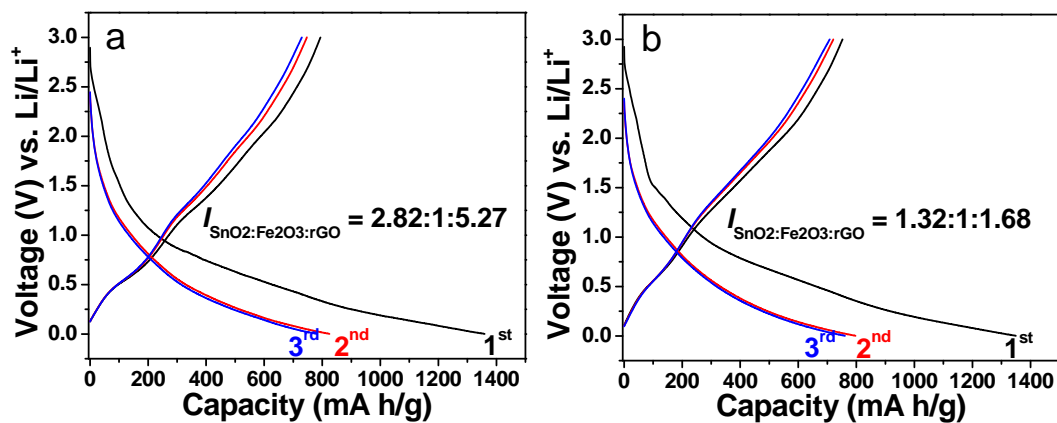
Figure S9 Charge-Discharge voltage profiles of the SnO_2-Fe_2O_3/rGO samples with (a) $I_{SnO2:Fe2O3:rGO}$ = 2.82 : 1 : 5.27 and (b) $I_{SnO2:Fe2O3:rGO}$ = 1.32 : 1 : 1.68 for the first three cycles at 0.5 C (395 mA/g).
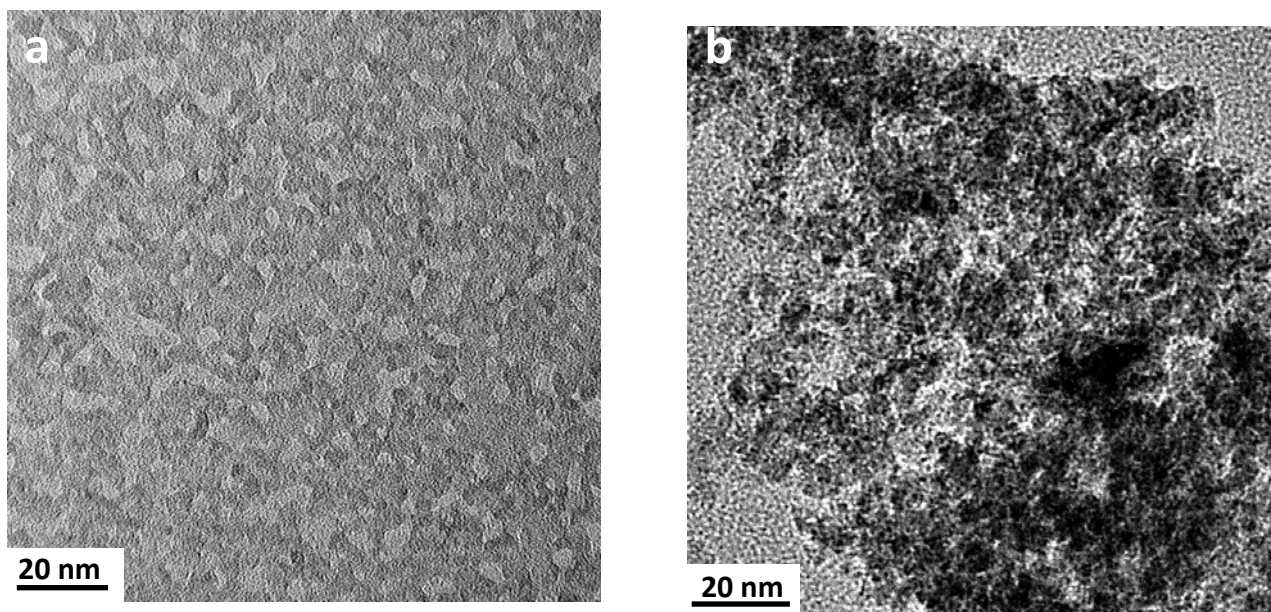
Figure S10 TEM images of (a) SnO_2-Fe_2O_3/rGO electrode with $I_{SnO2:Fe2O3:rGO}$ = 11 : 1 : 13 and (b) SnO_2/rGO electrode $I_{SnO2:rGO}$ = 0.96 : 1 after 100 charge discharge cycles at a current density of 0.5 C. Here, the coin cells were opened in the glove box and the sample was then washed by N-methyl-2-pyrrolidinone (NMP) and further dried under room conditions. The resultant samples were dispersed in ethanol and dropped on copper grid for TEM characterization.

Table SI: The weight ratios of the resultant samples calculated from TGA analysis and EDX results.

Weight ratios	Precursors		
	$SnCl_2$ (mg)	$FeCl_2$ (mg)	GO (mg)
$I_{SnO2:rGO}$ = 0.39 : 1	55	0	50
$I_{SnO2:rGO}$ = 0.96: 1	182	0	50
$I_{SnO2:rGO}$ = 1.78 : 1	364	0	50
$I_{SnO2:Fe2O3:rGO}$ = 11 : 1 : 13	182	100	50
$I_{SnO2:Fe2O3:rGO}$ = 2.82 : 1 : 5.27	91	200	50
$I_{SnO2:Fe2O3:rGO}$ = 1.32 : 1: 1.68	39	200	50