

Synthesis and characterisation of heteroatom-doped reduced graphene oxide/bismuth oxide nanocomposites and their application as photoanodes in DSSCs

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Supplementary Data

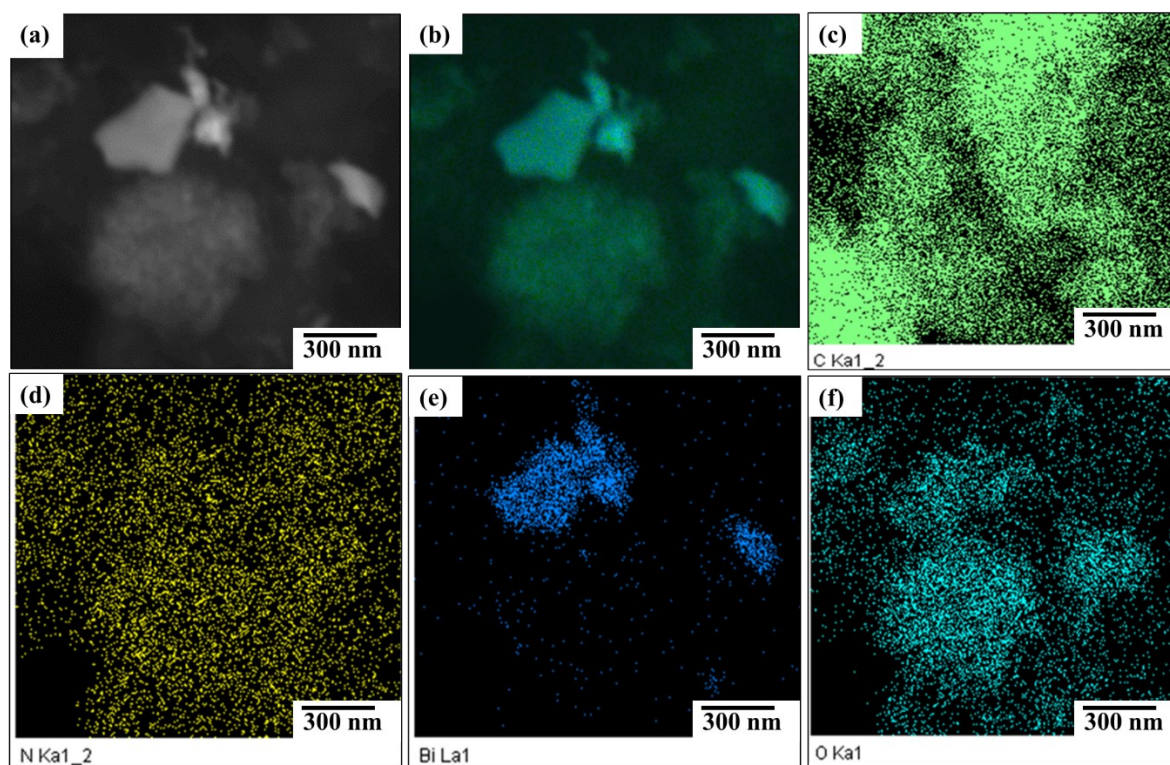


Figure S1: (a) TEM image of N-rGO/Bi₂O₃, and (b) elemental mapping of the elements in N-rGO/Bi₂O₃. Corresponding individual mapping of (c) carbon, (d) nitrogen, (e) bismuth and (f) oxygen for N-rGO/Bi₂O₃ nanocomposite.

Table S1: Elemental composition of the nanocomposites.

Sample	Elemental analysis				ICP-OES	
	Carbon/%	Hydrogen/%	Oxygen/%	Nitrogen/%	Boron/%	Bi ₂ O ₃ /%
rGO/Bi ₂ O ₃	67.61 ± 1	3.82 ± 1	3.57 ± 1	-	-	20.8 ± 0.01
N-rGO/Bi ₂ O ₃	59.28 ± 1	5.43 ± 1	3.01 ± 1	3.76 ± 1	-	28.5 ± 0.02
B-rGO/Bi ₂ O ₃	66.39 ± 1	3.69 ± 1	2.36 ± 1	-	2.56 ± 0.02	25.0 ± 0.01

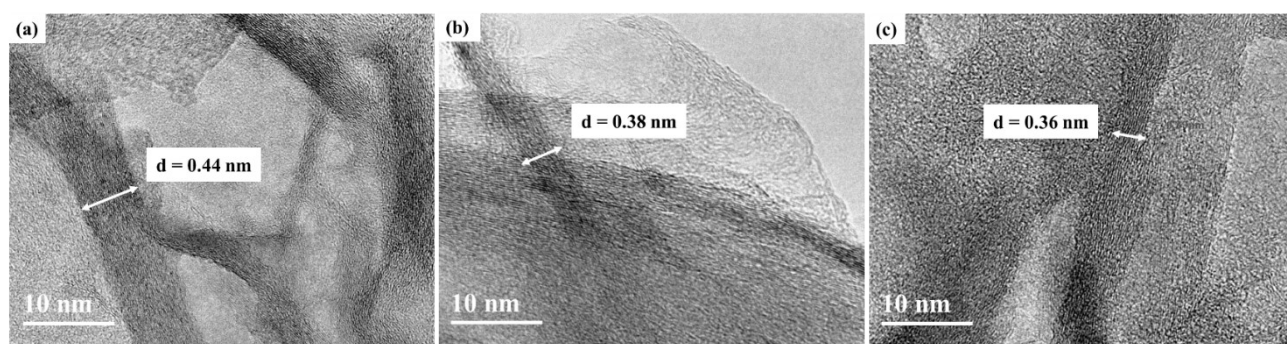


Figure S2: HRTEM image of (a) rGO, (b) N-rGO, and (c) B-rGO.

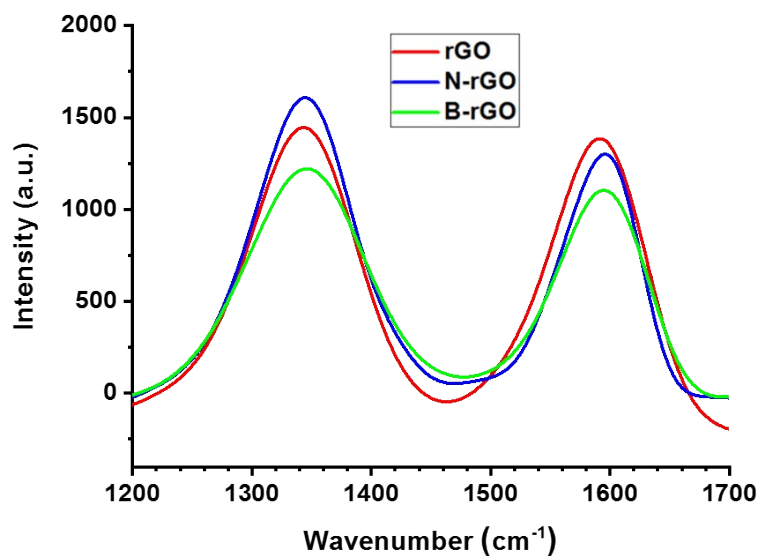


Figure S3: Raman spectra of rGO, N-rGO, and B-rGO.

Table S2: Raman spectral properties of rGO and heteroatom-doped rGO.

Sample	D-band/cm ⁻¹	G-band/cm ⁻¹	I_D/I_G
rGO	1350	1594	0.71
N-rGO	1350	1598	1.09
B-rGO	1350	1599	1.18

Table S3: Decomposition temperatures and residual content of the nanocomposites.

Sample	Decomposition temperature/°C	Residual content/%
rGO/Bi ₂ O ₃	518	42
N-rGO/Bi ₂ O ₃	490	57
B-rGO/Bi ₂ O ₃	437	38

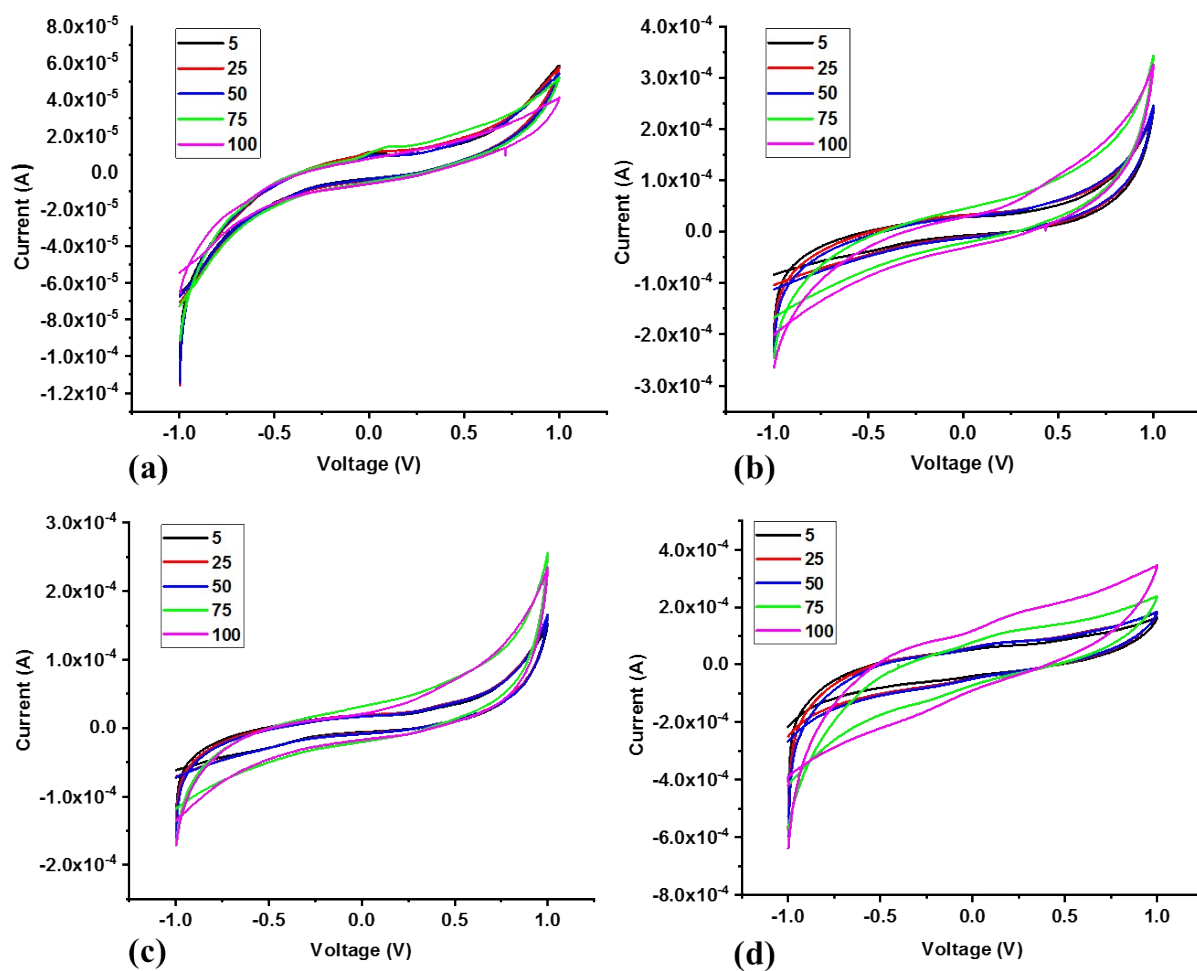


Figure S4: (a) Cyclic voltammograms of (a) Bi_2O_3 , (b) $\text{rGO}/\text{Bi}_2\text{O}_3$, (c) $\text{N-rGO}/\text{Bi}_2\text{O}_3$ and (d) $\text{B-rGO}/\text{Bi}_2\text{O}_3$ at scan rates of 5, 25, 50, 75, and 100 mV s^{-1} , in the potential range from -1.0 to 1.0 V.