Supporting Information

# Superior Supercpacitor Performance of $Bi_2S_3$ Nanorods/Reduced Graphene Oxide

Kalyan Ghosh[a] and Suneel Kumar Srivastava[a,b,*]

[a]Department of Chemistry, Indian Institute of Technology Kharagpur, Kharagpur, India - 721302.

[b] School of Energy Science and Engineering, Indian Institute of Technology, Kharagpur-721302

Email: kgkalyang5@gmail.com

*Corresponding Author. Email: sunil111954@yahoo.co.uk

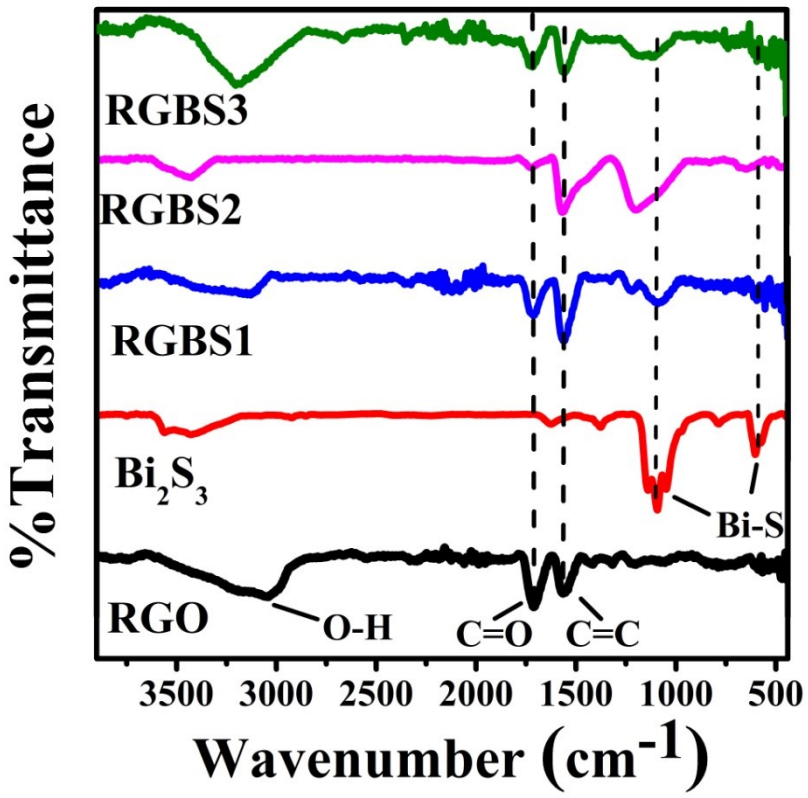
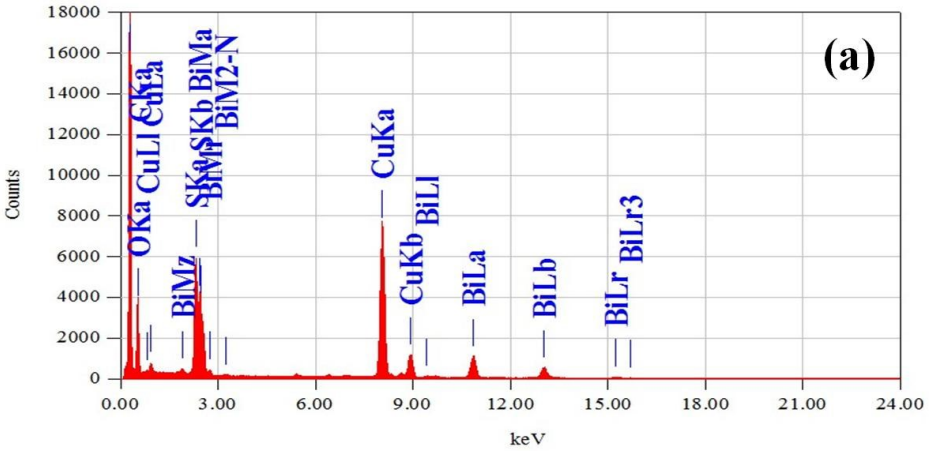



**Figure S1.** FTIR spectra of RGO, $Bi_2S_3$ and $Bi_2S_3$ nanorods/RGO composites.

The energy dispersive x-ray (EDX) analysis of $Bi_2S_3$/RGO composite was also performed to further discover the composition of the composites. As shown in Figure S2, EDX spectrum clearly demonstrated co-existence of Bi and S and closely corresponds to the $Bi_2S_3$ phase.[1] The additional signals in the spectra correspond to C and O elements could be attributed to the carbon-coated copper grid and from RGO.




| Element | Mass% | Atomic% (b) |
|---|---|---|
| CK | 47.55 | 81.11 |
| OK | 4.32 | 5.53 |
| SK | 5.83 | 3.72 |
| BiM | 17.84 | 1.75 |
| CuK(Ref.) | 24.47 | 7.89 |
| Total | 100 | 100 |

**Figure S2.** (a) EDX spectra and (b) elemental composition table of RGBS2 nanocomposite.

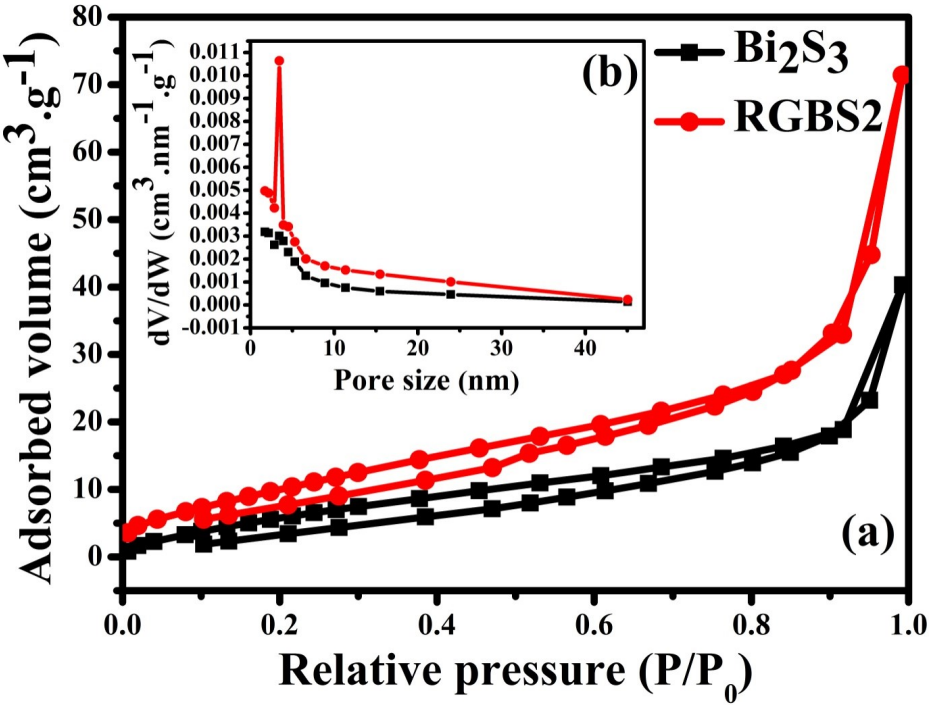



**Figure S3.** (a) $N_2$ adsorption-desorption isotherms and (b) pore size distribution of $Bi_2S_3$ and RGBS2 nanocomposite.

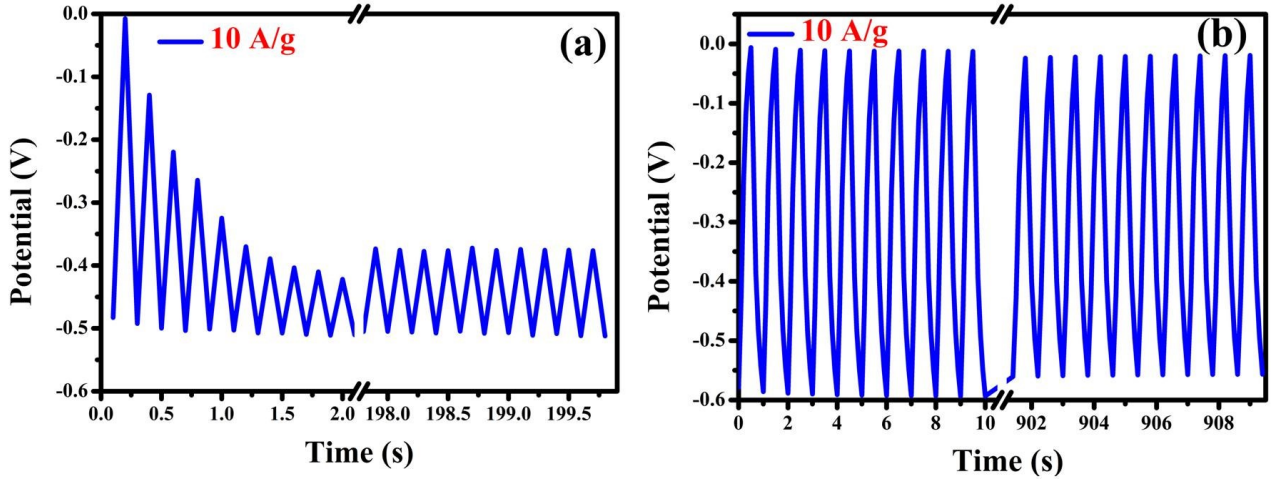



**Figure S4.** Charge-discharge curve of (a) $Bi_2S_3$ and (b) RGO at a current density of 10 A $g^{-1}$ over 1000 cycles.

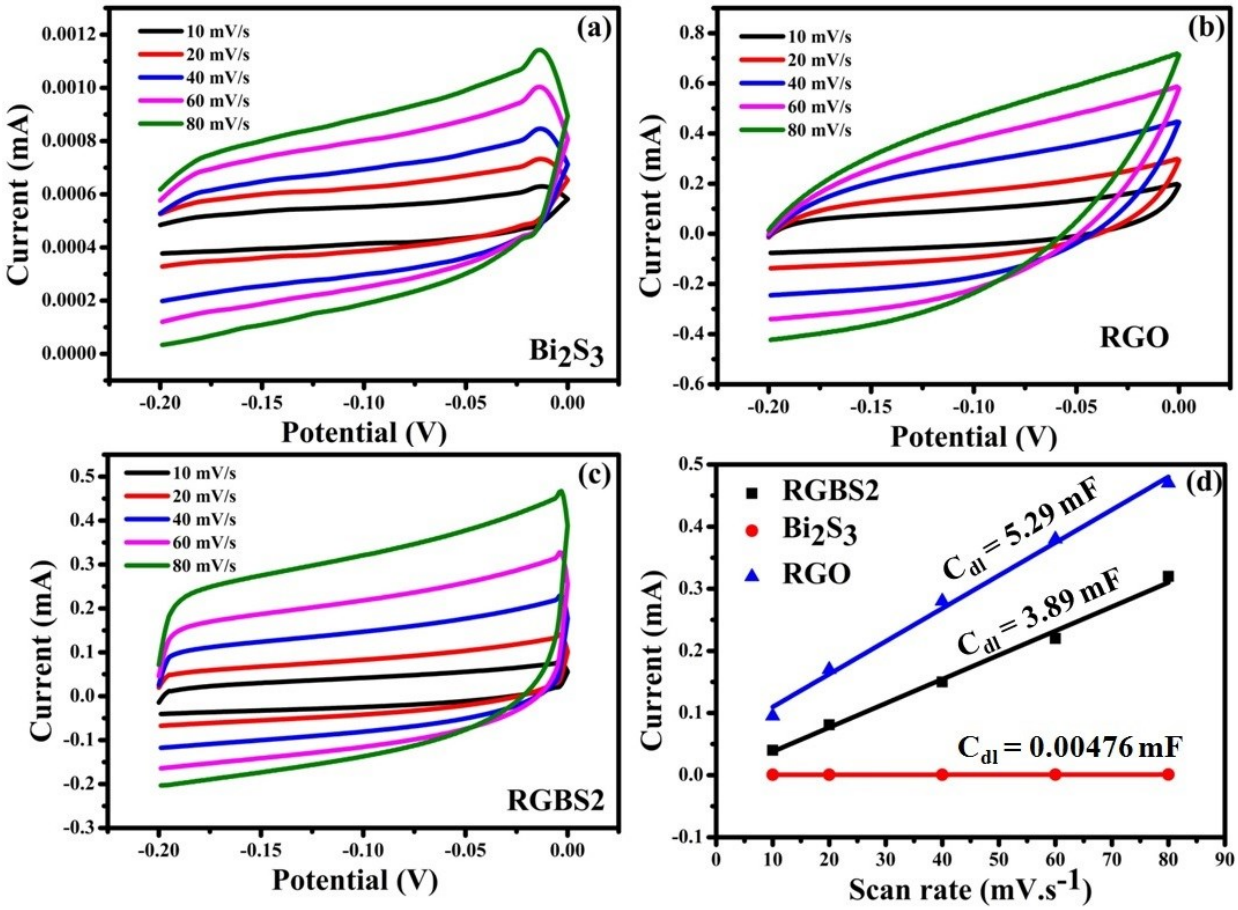



**Figure S5.** CV curve at different scan rate (10-80 $mV.s^{-1}$) in the non-faradic region of (a) $Bi_2S_3$, (b) RGO and (c) RGBS2 and (d) their corresponding electrochemical double layer capacitance.

**Table S1.** ECSA values of $Bi_2S_3$, RGO and RGBS2 nanocomposite respectively

| Sample codes | $C_{dl}$ (mF) | ECSA ($cm^2$) |
|---|---|---|
| $Bi_2S_3$ | 0.00476 | 0.1190 |
| RGO | 5.29 | 132.25 |
| RGBS2 | 3.89 | 97.25 |

**Reference:**

1. S. V. P. Vattikuti, A. K. R. Police, J. Shim and C. Byon, *Sci. Rep.,* 2018, **8**, 4194.