

Supporting Information

Carbon-Sulfur Bond Stabilized Co_9S_8 -Graphene Layered Structure with Excellent Hydrogen Storage Capacity

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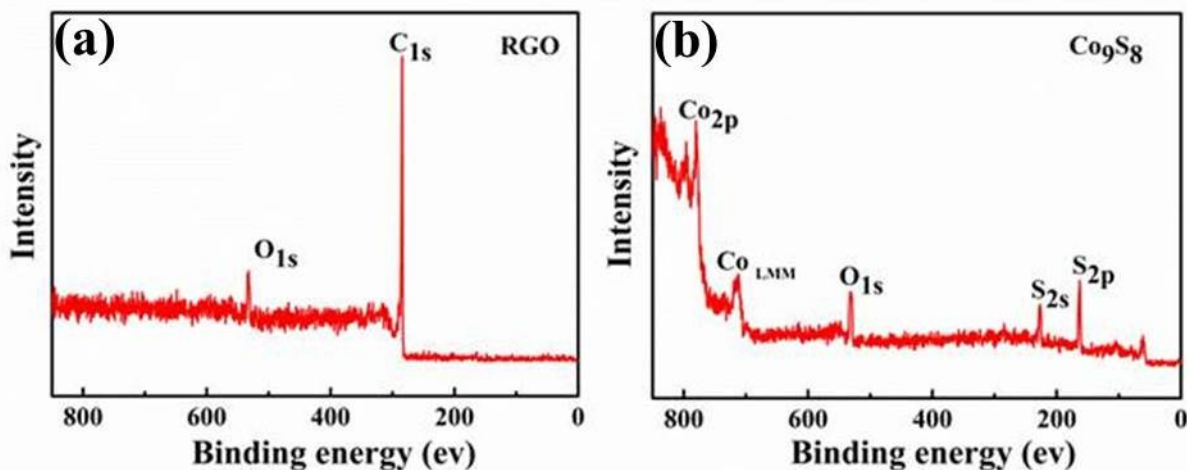


Figure S1. XPS spectrum of: (a) RGO; (b) Co_9S_8 .

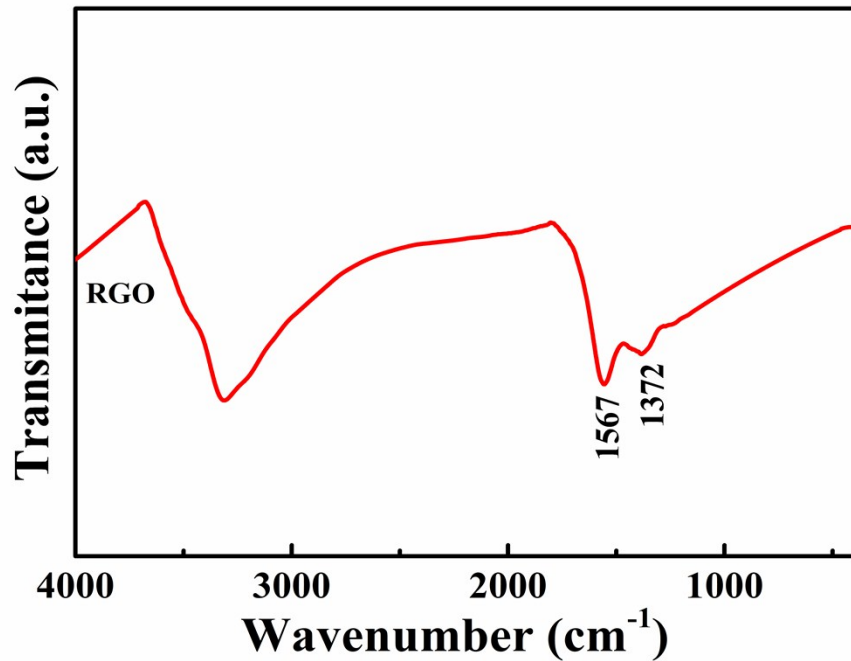


Figure S2. FTIR spectrum of ball milled RGO at the speed of 600 rpm for 15h under Ar gas atmosphere.

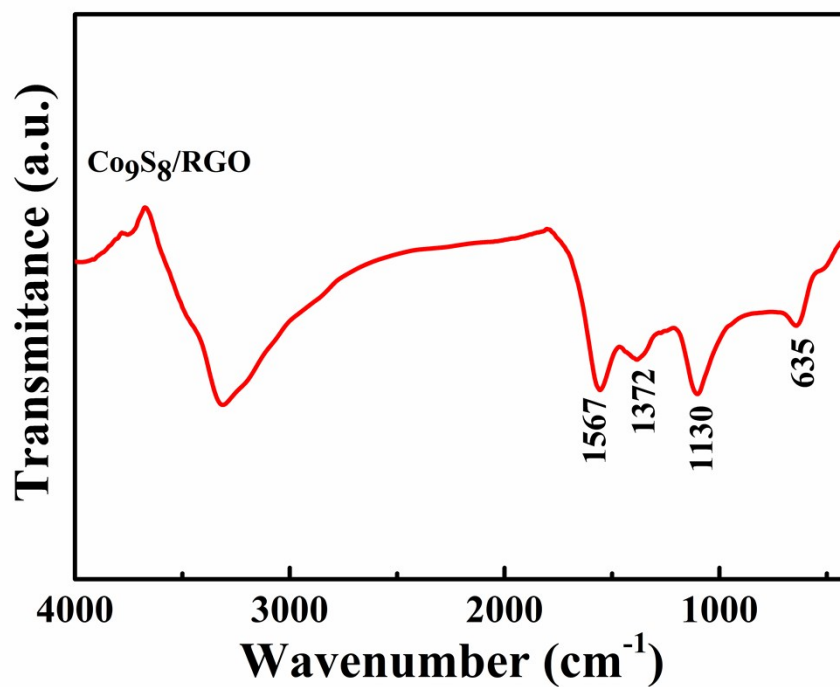


Figure S3. FTIR spectrum of discharged $\text{Co}_9\text{S}_8/\text{RGO}$ composite ($m_{\text{Co}_9\text{S}_8}:m_{\text{RGO}} = 6:1$).

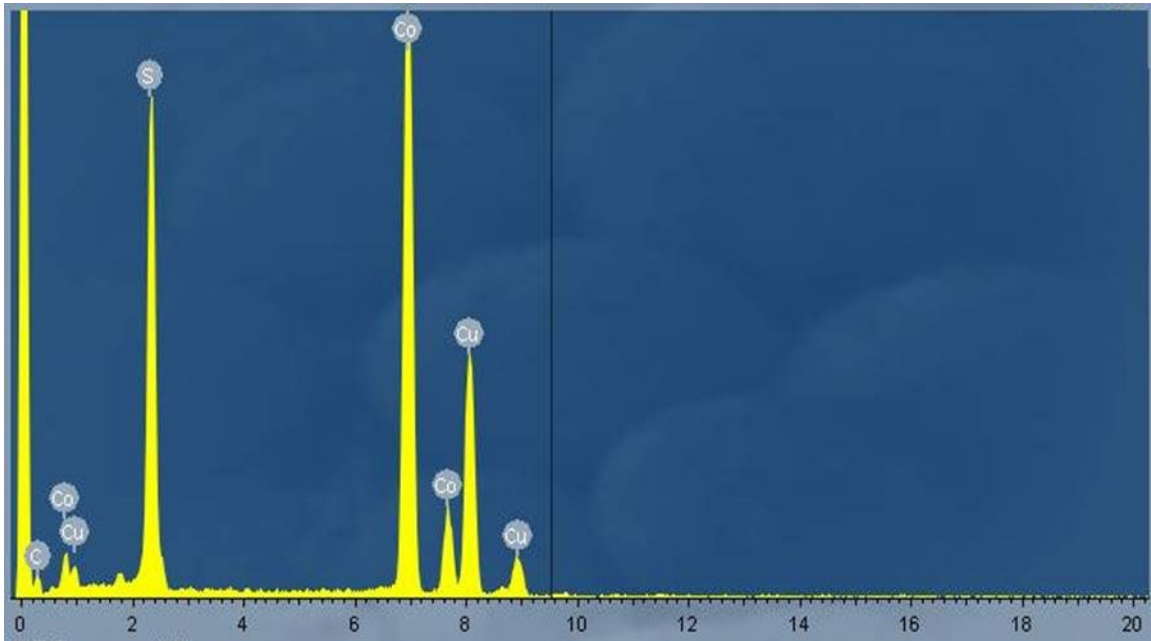


Figure S4. EDS images of the $\text{Co}_9\text{S}_8/\text{RGO}$ composite.

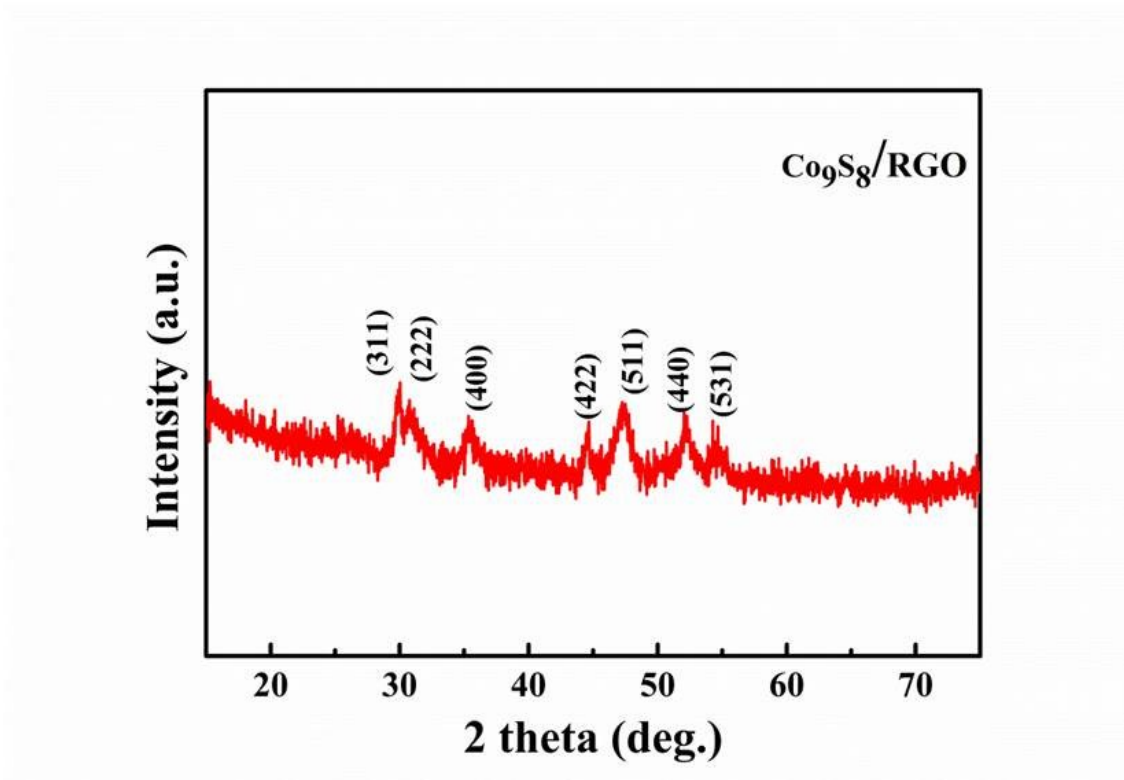


Figure S5. XRD patterns of the discharged $\text{Co}_9\text{S}_8/\text{RGO}$ composite ($m_{\text{Co}_9\text{S}_8}:m_{\text{RGO}} = 6:1$).

Table S1. Elemental content of the Co₉S₈/RGO composite.

| Sample | Atomic percent (wt%) | | | |
|-------------------------------------|----------------------|-------|-------|-------|
| | C | S | Co | Cu |
| Co ₉ S ₈ /RGO | 5.59 | 35.90 | 40.92 | 17.59 |

Table S2. Capacity retention ratio of the Co₉S₈/RGO composite with the weight ratios of (a) 4:1; (b) 5:1; (c) 7:1; (d) 8:1..

| Sample m _{Co₉S₈} :m _{RGO} | Hydrogen storage capacity (wt%) | Capacity after 50 cycles (wt%) | Capacity retention ratio (%) |
|--|------------------------------------|-----------------------------------|---------------------------------|
| 4:1 | 4.26 | 3.00 | 70 |
| 5:1 | 4.57 | 3.48 | 76 |
| 6:1 | 4.86 | 3.90 | 80 |
| 7:1 | 3.96 | 2.42 | 61 |
| 8:1 | 3.60 | 2.09 | 58 |