

Supplementary Information

Facile and ecofriendly green Synthesis of $\text{Co}_3\text{O}_4/\text{MgO-SiO}_2$ Composites towards efficient asymmetric supercapacitor and oxygen evolution reaction applications

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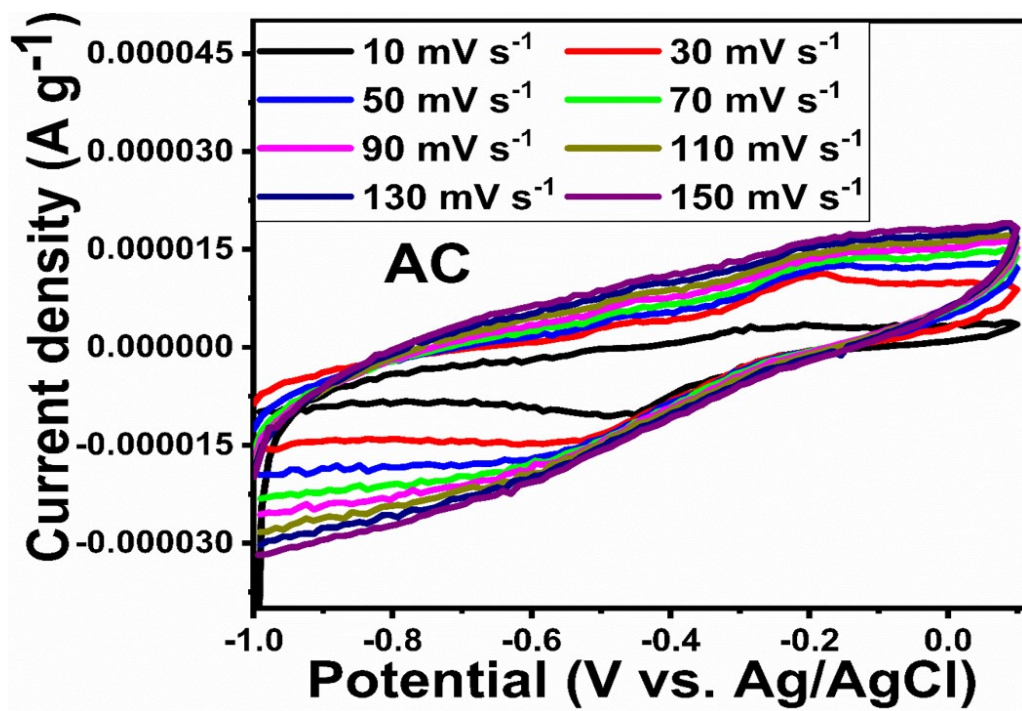


Figure (S1): CV curves of rice husk derived activated carbon (Ac) at various scan rates in 1M KOH aqueous solution.

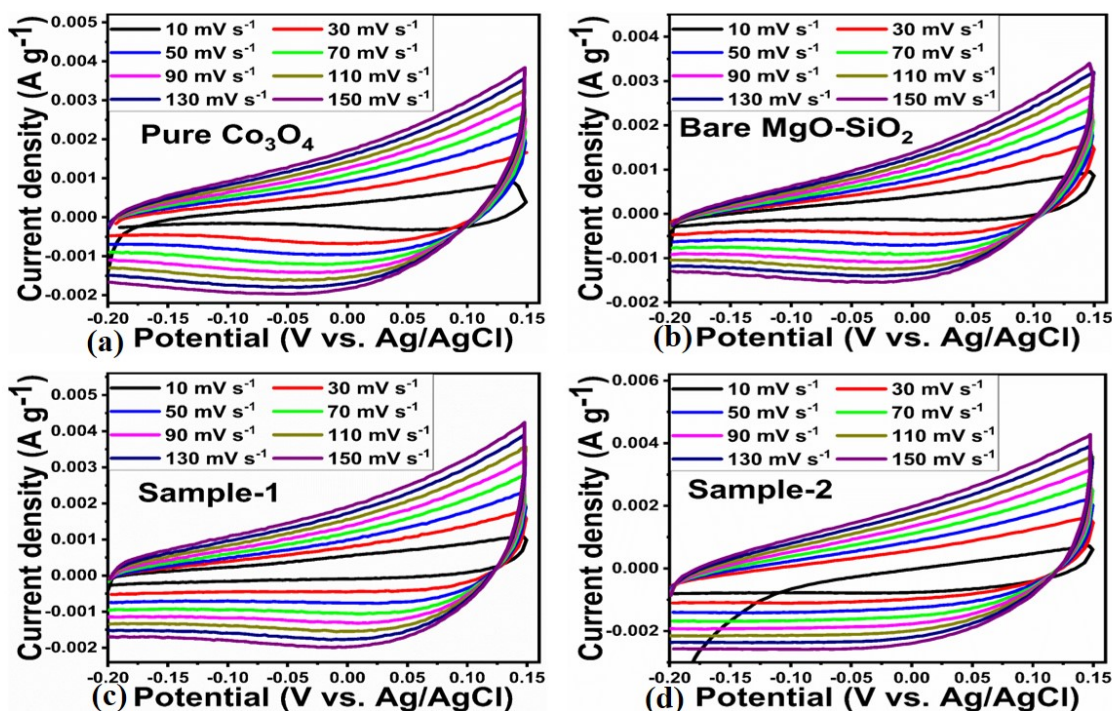


Figure (S2): CV curves at various scan rates in 1M KOH aqueous solution (a) pure Co_3O_4 , (b) bare MgO-SiO_2 , (c) $\text{Co}_3\text{O}_4/\text{MgO-SiO}_2$ composite (sample1), (d) $\text{Co}_3\text{O}_4/\text{MgO-SiO}_2$ composite (sample 2).

Table (S1): Comparative analysis of presented supercapacitor based on $\text{Co}_3\text{O}_4/\text{MgO-SiO}_2$ composite (sample 2).

| Material | Specific Capacitance (F/g) | Current Density (A/g) | Potential Window (V) | Energy Density (Wh kg^{-1}) | Power Density (W kg^{-1}) | Reference |
|--|----------------------------|-----------------------|----------------------|--|--------------------------------------|-----------|
| MWCNTs | 84 F/g | 0.6 A/g | -0.5 to 2.2 V | 21 | 6237 | [35] |
| Ni-Co-O-1 | 568 F/g | 20 A/g | 0 to 0.5 V | 19.72 | 5000 | [36] |
| NiCo ₂ O ₄ (Lemon juice) | 358 F/g | 0.8 A/g | 0 to 0.4 V | 7.96 | 160 | [37] |
| NiCo ₂ O ₄ (Grapefruit) | 434 F/g | 0.8 A/g | 0 to 0.4 V | 9.64 | 160 | [38] |
| NiCo ₂ O ₄ (OP-1) | 997 F/g | 1.5 A/g | 0 to 0.4 V | 22.17 | 300 | [39] |

| | | | | | | |
|--|-----------------------|----------------------------------|-----------------------|--------------|---------------|------------------|
| Sample 1 Co ₃ O ₄ | 867 F g ⁻¹ | 1.5 Ag ⁻ ₁ | 0 to 0.4 V | 18.41 | 239.25 | [40] |
| Co ₃ O ₄ | 699 F g ⁻¹ | 0.8 A g ⁻¹ | 0 to 0.4 V | 30 | 236 | [41] |
| MnO/FLG | 778.5 | 0.5 A g ⁻¹ | 0 to 1 V | 81 | 292 | [42] |
| CoNi-alloy | 132 Fg ⁻¹ | 1 Ag ⁻ | 0 to 1 V | 4.60 | 250 | [43] |
| S, N-FLG | 298 F g ⁻¹ | 1 A g ⁻¹ | 0 to -0.6 | 15 | 298 | [44] |
| Sample-2 | 1147.98 | 2 A/g | 0 to 0.4 V | 25.00 | 396.00 | This Work |

Table (S2): OER comparative study of Co₃O₄/MgO-SiO₂ composite (sample 2).

| Catalyst | Over potential (mV) @ 10 mA/cm² | Electrolyte | References |
|--|---|--------------------|-------------------|
| CoS _x /MoS ₂ | 347 | 1.0 M KOH | [45] |
| MOF derived-NiCo ₂ O ₄ / NiO | 430 | 1.0 M KOH | [46] |
| NiCo ₂ O ₄ /NiO | 360 | 1.0 M KOH | [47] |
| NiCo ₂ O ₄ @Graphene nanosheets | 383 | 1.0 M KOH | [48] |
| NiCo ₂ O ₄ @NiCo ₂ O ₄ | 440 | 1.0 M KOH | [49] |
| NiCo film | 422 | 0.5 M KOH | [50] |
| Sample-2 | 340 | 1.0 M KOH | This Work |