

Supplementary Materials

Free-Standing, Interwoven Tubular Graphene Mesh-Supported Binary AuPt Nanocatalysts: An Innovative and High-Performance Anode Methanol Oxidation Catalyst

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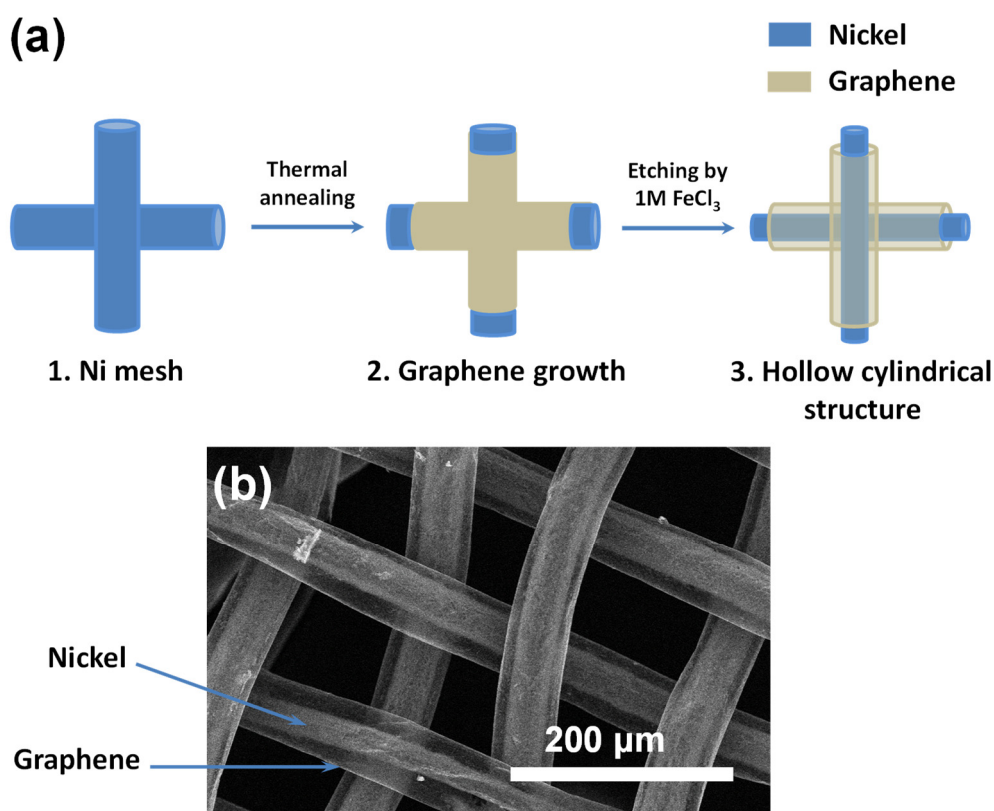
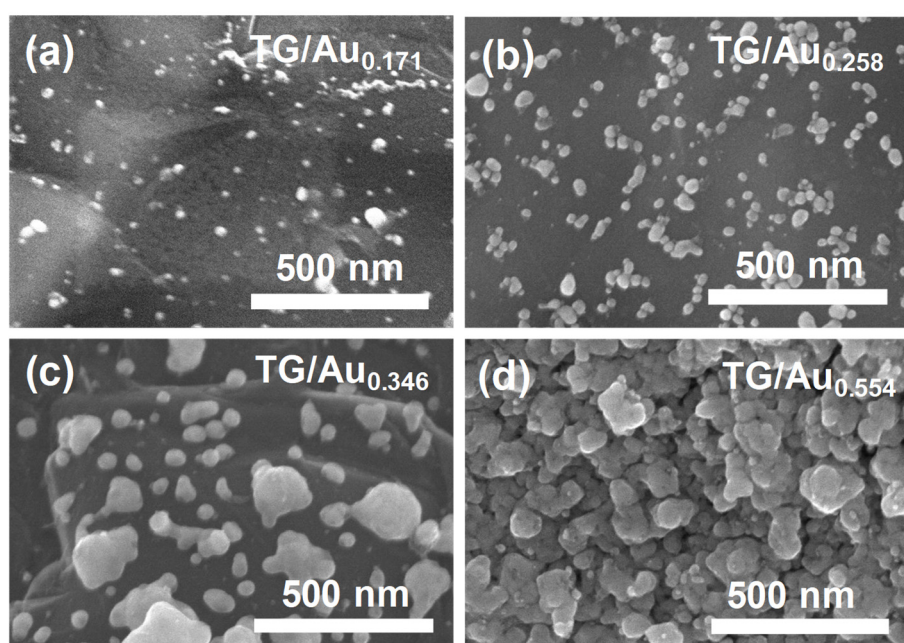
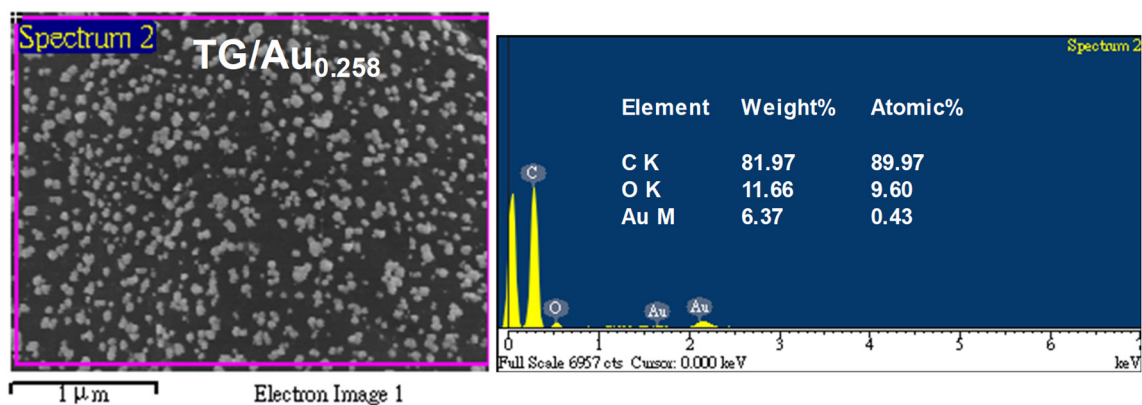


Figure S1. (a) The illustration for the preparation of hollow cylindrical structures, (b) SEM image of a typical hollow cylindrical structure of graphene-covered Ni mesh.

Table S1. ICP-MS results of TG/Au_x catalysts. V_{Au}: the adding volume of HAuCl₄ precursor solution.

| Catalyst | V _{Au} (μl) | m _{Au} (mg) |
|------------------------|----------------------|----------------------|
| TG/Au _{0.171} | 60 | 0.171 |
| TG/Au _{0.258} | 90 | 0.258 |
| TG/Au _{0.346} | 120 | 0.346 |
| TG/Au _{0.554} | 180 | 0.554 |

**Figure S2.** FE-SEM images of TG/Au_x with different mass loadings of Au NPs.**Figure S3.** EDS result of the TG/Au_{0.258} catalyst.

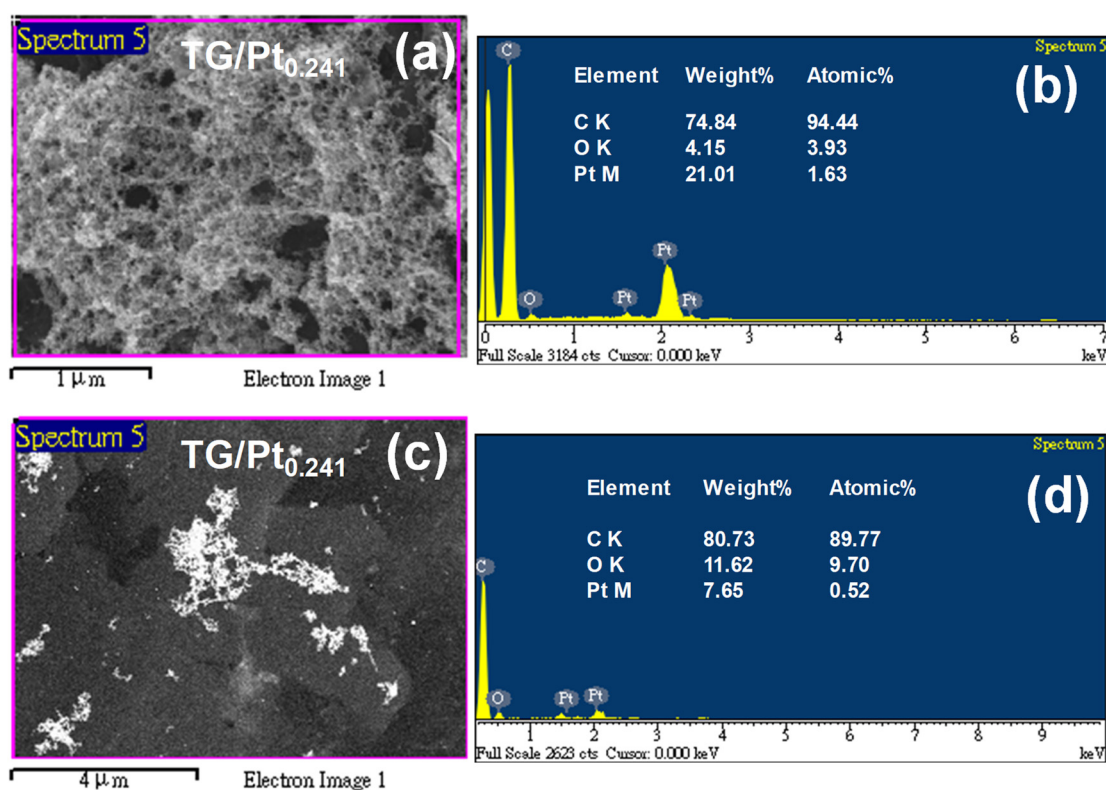


Figure S4. EDS analyses for the TG/Pt_{0.241} catalyst obtained by scanning on the high coverage (a,b) and low coverage (c, d) of Pt NPs areas.

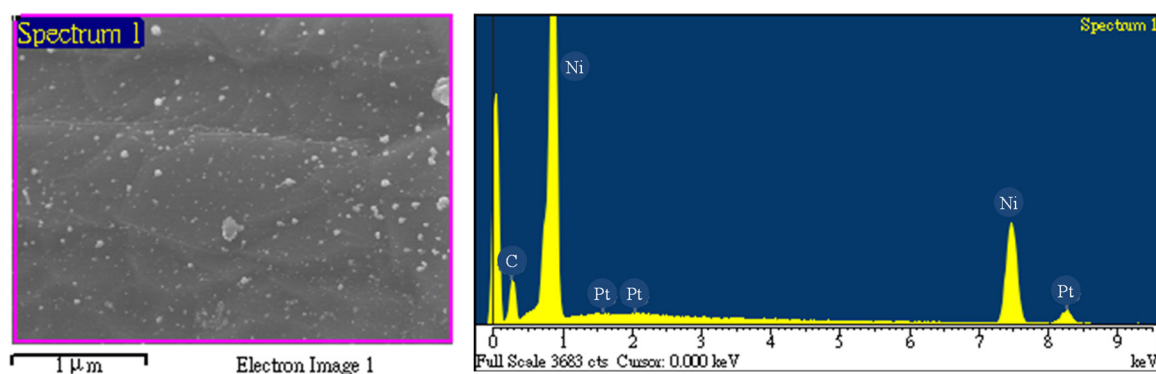


Figure S5. EDS analysis of the TG/Pt_{0.241} before removing Ni. Oxygen was not found in the sample.

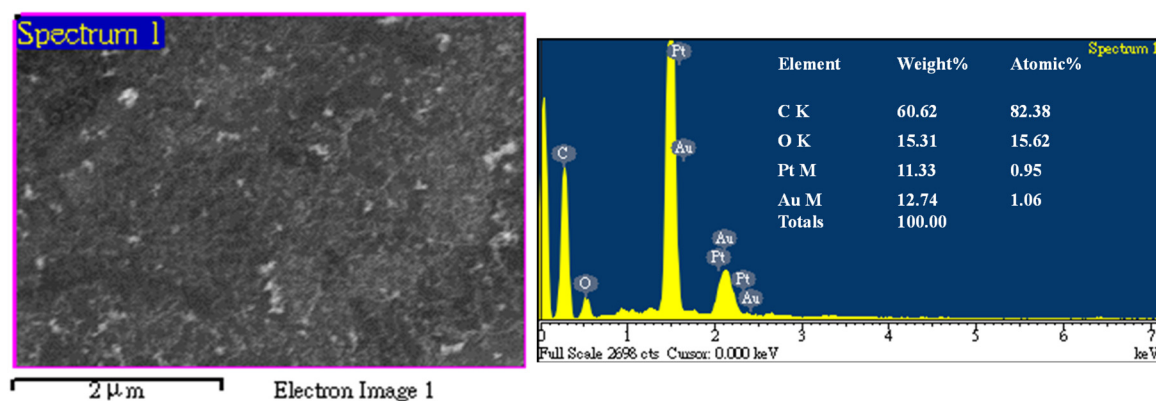


Figure S6. EDS analysis for the TG/Au₅₂Pt₄₈ catalyst. Right panel shows the elemental distribution of C, O, Au, and Pt.

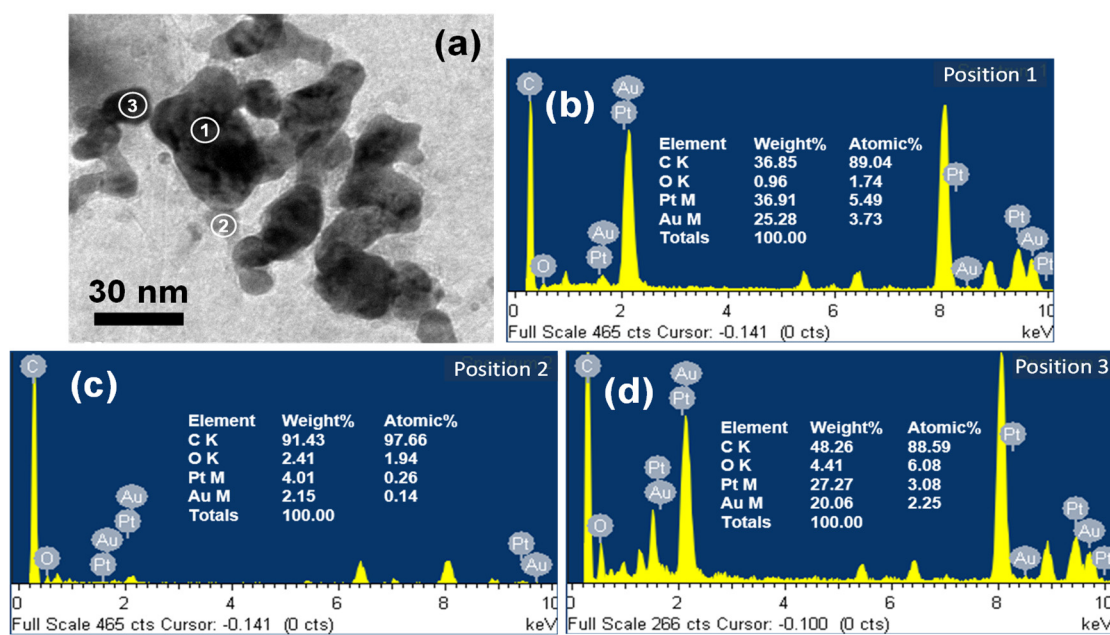


Figure S7. (a-d) TEM-EDS analyses for the TG/Au₅₂Pt₄₈ catalyst at three different nano-areas.

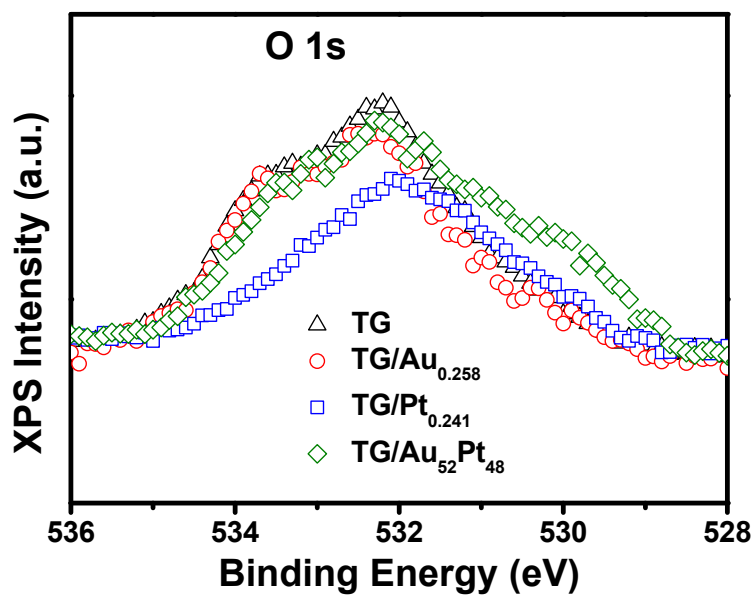


Figure S8. XPS O 1s scans of the TG-based catalysts.

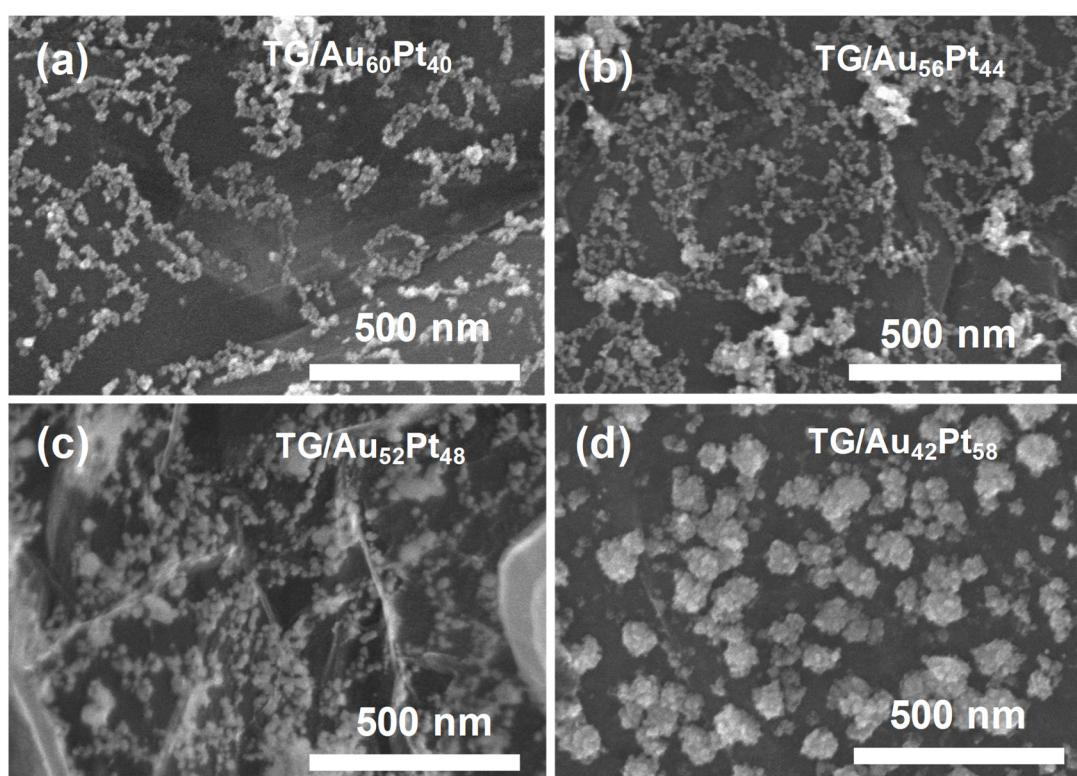


Figure S9. SEM images of TG/Au_xPt_y catalysts obtained with different concentrations of Pt precursor.

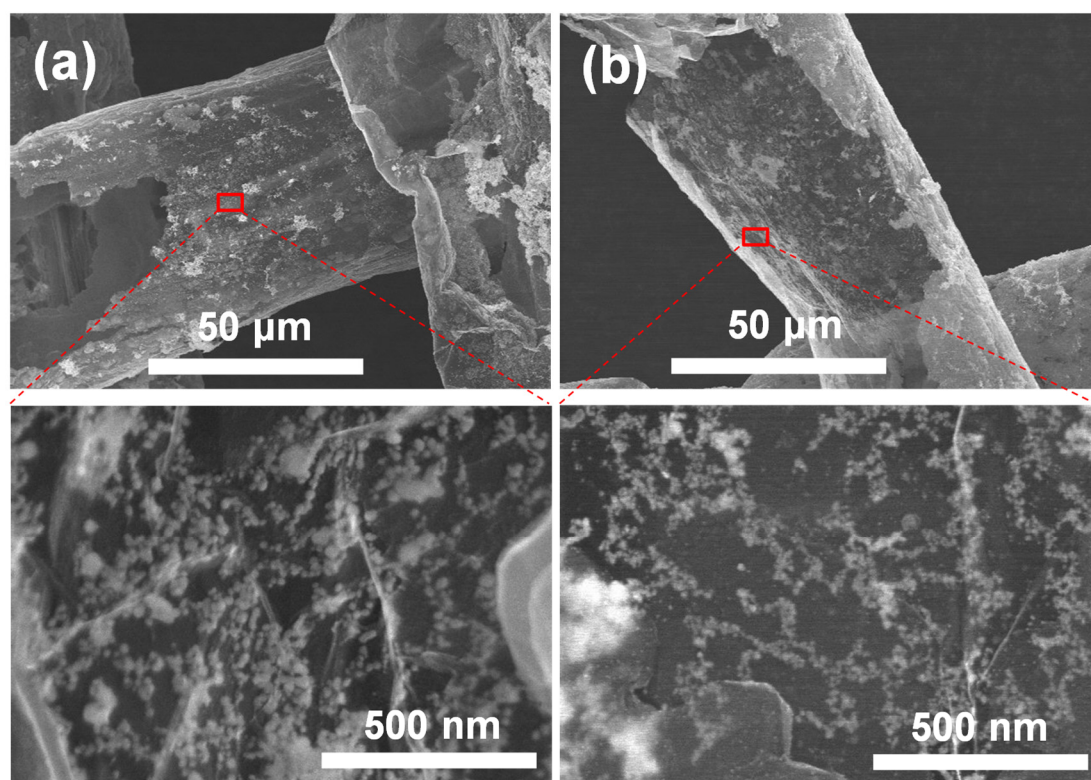


Figure S10. SEM images at low (upper panels) and high magnification (bottom panels) of the TG'/Au₅₃Pt₄₇: The distribution of binary AuPt NPs on the outer wall (a) and the inner wall (b) of a graphene tube.

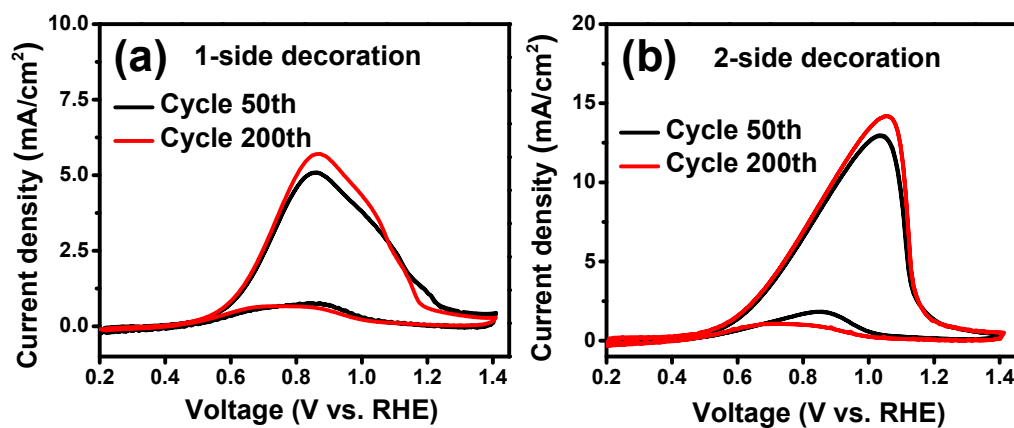


Figure S11. CVs of methanol oxidation at the cycle number of 50 and 200 recorded in 0.5M KOH + 1M CH₃OH solution of the TG/Au₅₂Pt₄₈ (a) and TG'/Au₅₃Pt₄₇ (b) catalysts.