Electronic Supplementary Information

Convenient Synthesis of Polymetallic Metal-Organic Gels for Efficient Methanol Electro-Oxidation

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S1: Additional characterization information

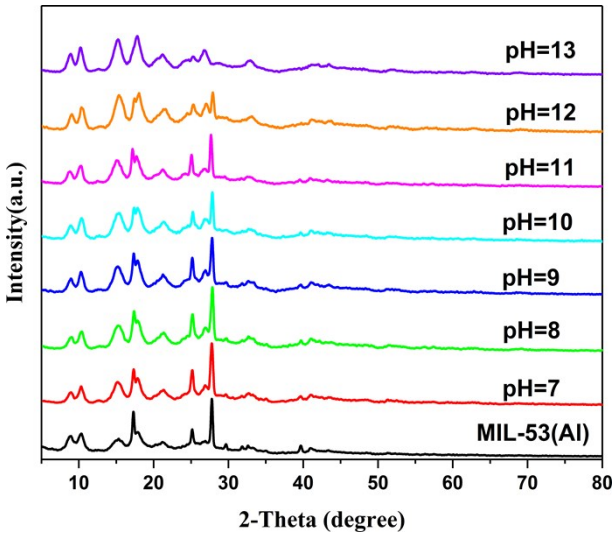

Fig. 1. MIL-53(Al)-MOG immersed in different pH environment for at least 24 h.

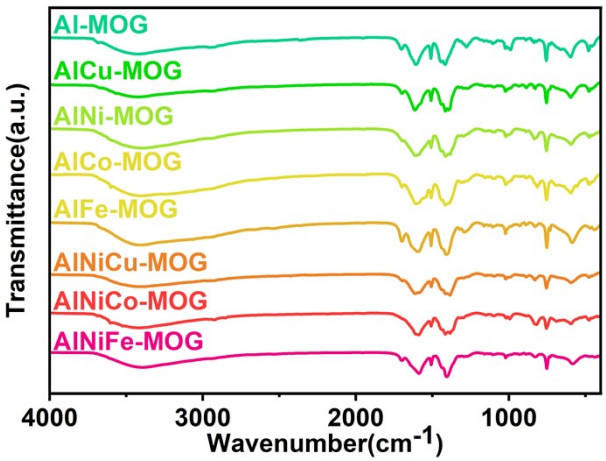

Fig. S2. FT-IR spectrums of the synthesized bimetallic and trimetallic MOGs.

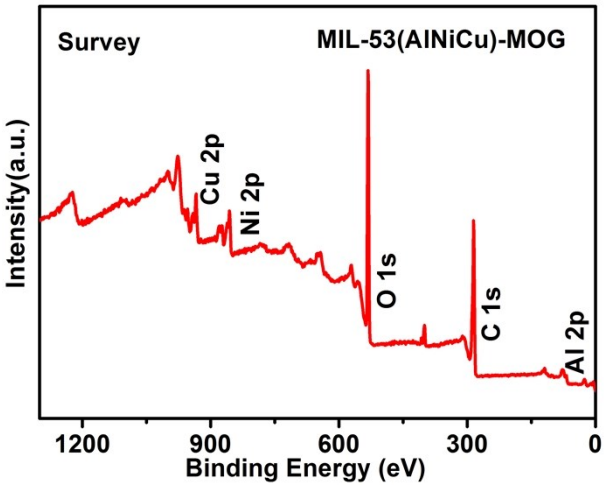

Fig. S3. The survey XPS spectra of the AlNiCu-MOG. Besides, the molar ratio of Al: Ni: Cu is close to 1:1:1, which was determined by inductively coupled plasma measurement.

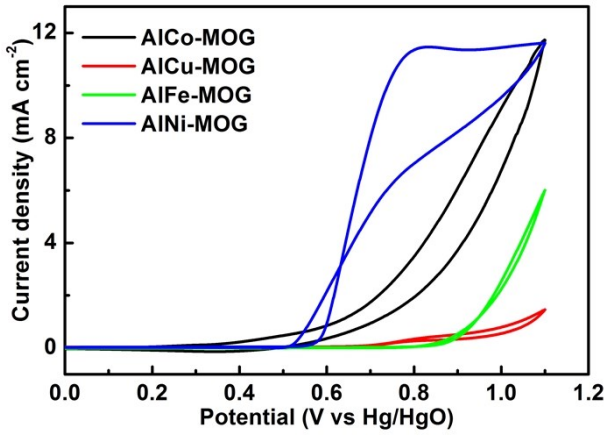

Fig. S4. CV curves for CH_3OH electro-oxidation of the bimetallic catalysts in the 0.1 M KOH with 1.0 M methanol.

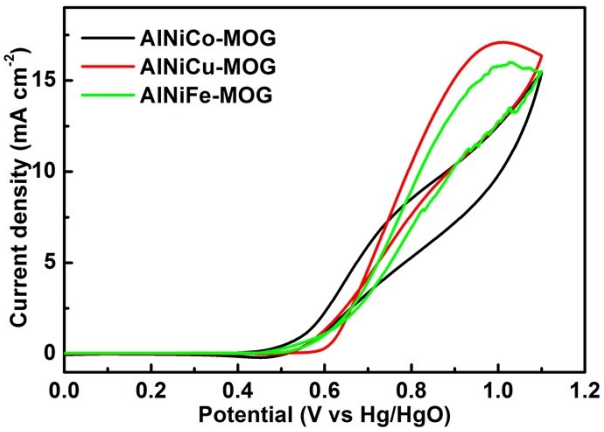

Fig. S5. CV curves for CH_3OH electro-oxidation of the trimetallic catalysts in the 0.1 M KOH with 1.0 M methanol.

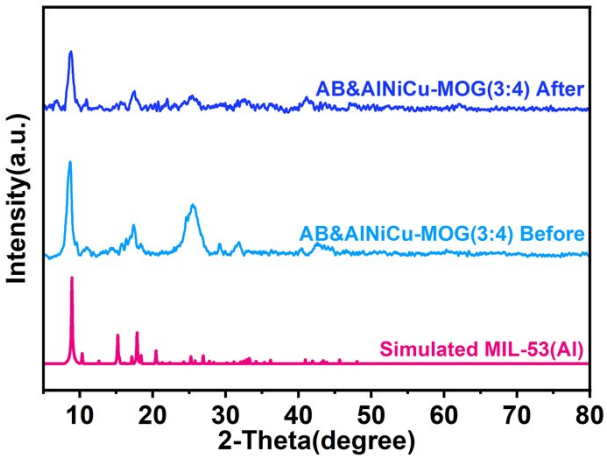

Fig. S6. The XRD patterns of the as-synthesized AB&AlNiCu-MOG (3:4) before and after MOR test.

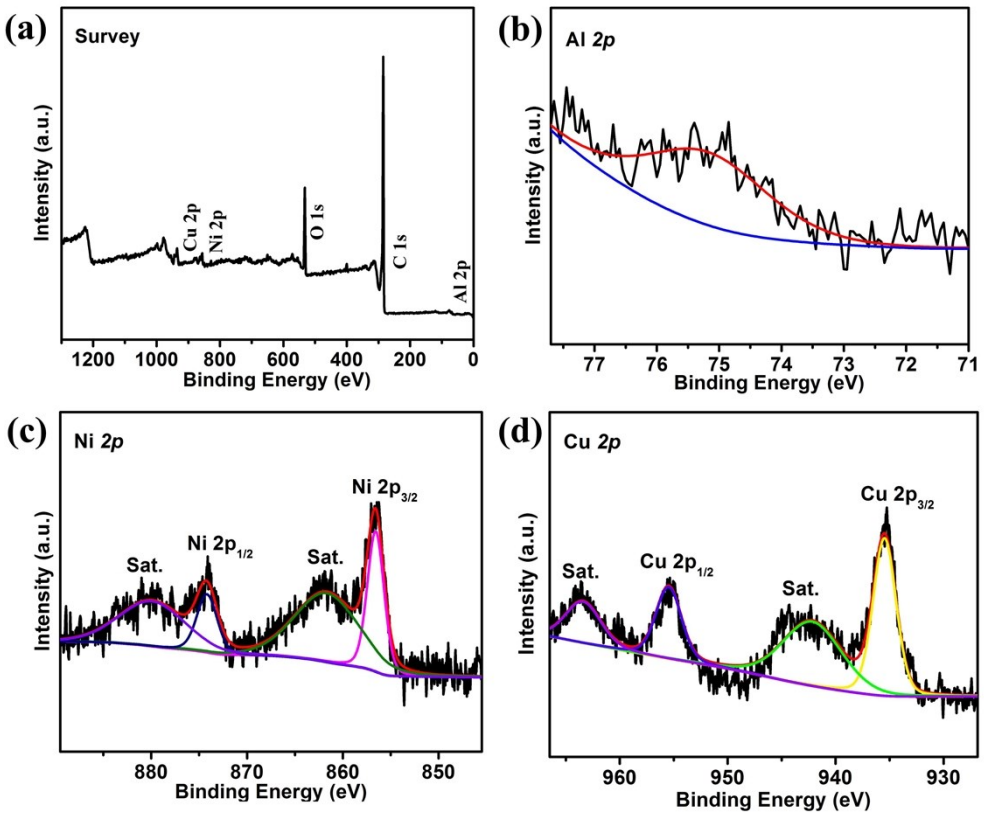

Fig. S7. XPS spectra (a) survey, (b) Al 2p, (c) Ni 2p and (d) Cu 2p of AB&AlNiCu-MOG (3:4) composite material.

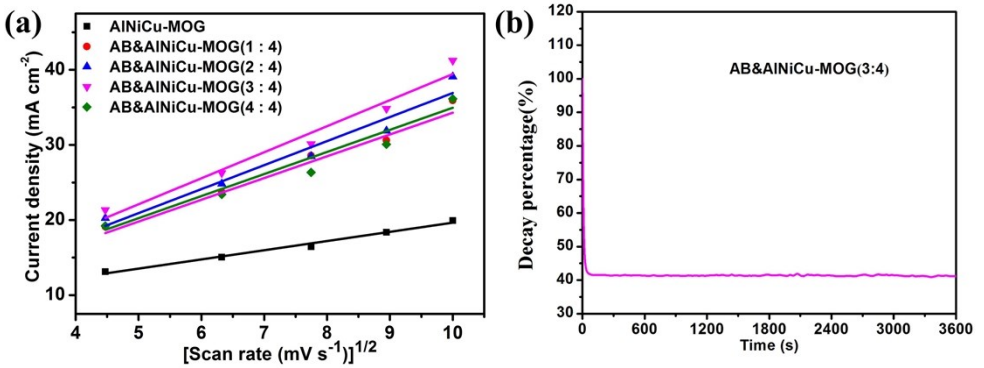

Fig. S8. (a) The linear relationship between current densities and square root of scan rates for AlNiCu-MOG and AB&AlNiCu-MOG composite materials. (b) Chronoamperometry plot of AB&AlNiCu-MOG (3:4) composite material in 0.1 M KOH with 1 M CH_3OH.

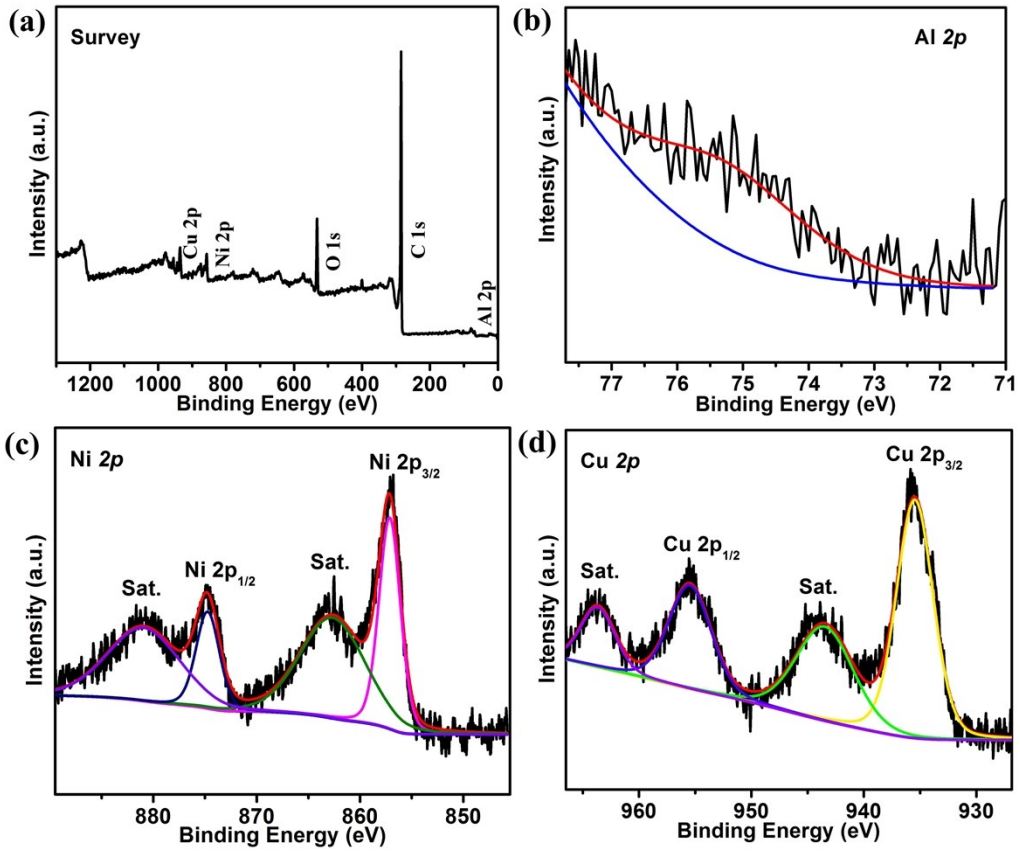

Fig. S9. XPS spectra (a) survey, (b) Al 2p, (c) Ni 2p and (d) Cu 2p of AB&AlNiCu-MOG (3:4) composite material after MOR test.

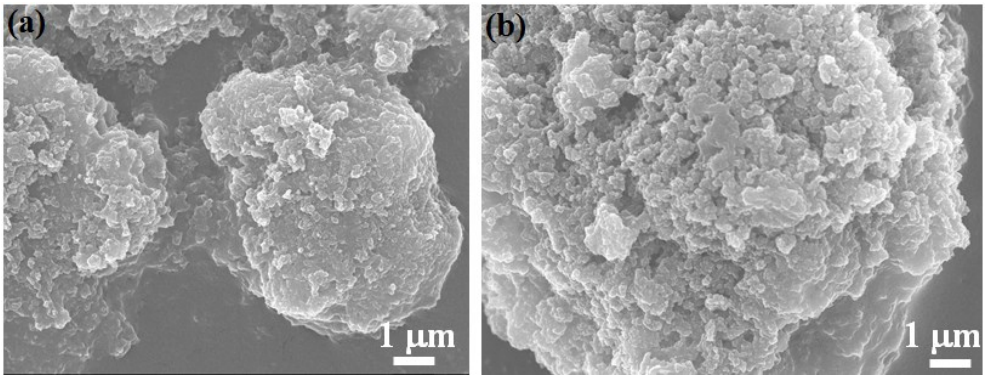

Fig. S10. SEM image of AB&AlNiCu-MOG (3:4) composite material (a) before and (b) after MOR stability measurements.

Table S1. Comparisons of MOR performance for various Ni-based electrocatalysts.

Electrode Materials	Scanning Rate ($mV\ s^{-1}$)	Peak Current Density ($mA\ cm^{-2}$)	Electrolyte	Reference
Ni-P/RGO	50	16.4	1.0M KOH + 0.5M CH_3OH	**1**
Mn Doped $Ni(OH)_2$	50	16.7	1.0M KOH + 0.5M CH_3OH	**2**
NiPtAu-SR_{Au} HNCs	50	31.52	1.0M KOH + 1.0M CH_3OH	**3**
NiO NTs-400	50	24.3	1.0M KOH + 0.5M CH_3OH	**4**
PtZn intermetallic NPs	50	1.15	0.1M KOH + 0.5M CH_3OH	**5**
Pt_1Ni_1/C	50	4.90	1.0M KOH + 1.0M CH_3OH	**6**
NiO-Ni-P	50	28.56	1.0M KOH + 0.5M CH_3OH	**7**
NiO-SnO_2/SO_4^{2-}	100	12.2	1.0M NaOH + 1.0M CH_3OH	**8**
5 wt. % GO/Co-MOF-71	50	29.1	1.0M KOH + 3.0M CH_3OH	**9**
AlNi-MOG	50	11.46	0.1M KOH + 1.0M CH_3OH	**this work**
AlNiCu-MOG	50	17.1	0.1M KOH + 1.0M CH_3OH	
AB&AlNiCu-MOG(1 : 4)	50	29.33	0.1M KOH + 1.0M CH_3OH	
AB&AlNiCu-MOG(2 : 4)	50	32.31	0.1M KOH + 1.0M CH_3OH	
AB&AlNiCu-MOG(3 : 4)	50	33.24	0.1M KOH + 1.0M CH_3OH	
AB&AlNiCu-MOG(4 : 4)	50	29.41	0.1M KOH + 1.0M CH_3OH	

References

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