Supporting Information

Functional Molecule Guided Evolution of MnO\textsubscript{x} Nanostructure Patterns on N-Graphene and Their Oxygen Reduction Activity

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**Figure S1.** Particle size distribution histogram of TMA@NGMnO$_x$/6.

**Figure S2.** TEM images of (a) TMA@NGMnO$_x$/8 and (b) TMA@NGMnO$_x$/12 (scale bar: 200 nm) and the corresponding SAED patterns (insert) (scale bar: 10 l/nm). (c) The XRD patterns of TMA@NGMnO$_x$/8 and TMA@NGMnO$_x$/12.
Figure S3. TEM images of (a) 0.5TMA@NGMnO₇/8 and (b) 0.5TMA@NGMnO₇/12 (scale bar: 200nm).

Figure S4. TEM images of BA@NGMnO₇/12 (a) Oval and (b) Wire structures (scale bar: 50 nm). (c) The XRD patterns of BA@NGMnO₇/12.
Figure S5. Survey scan of TMA@NGMnO$_x$/6 hybrid with atomic percentage.

Figure S6. Survey scan N 1s XPS spectra for NG, BA@NG, BA@NGMnO$_x$/8 and TMA@NGMnO$_x$/6 hybrids.
Figure S7. Raman spectra of (a) TMA@NGMnO$_x$/2 and TMA@NGMnO$_x$/6 (b) BA@NGMnO$_x$/2, BA@NGMnO$_x$/6 and BA@NGMnO$_x$/8 hybrids.

Figure S8. RDE plots of (a) TMA@NGMnO$_x$/2 (c) BA@NGMnO$_x$/2 and (e) BA@NGMnO$_x$/8 at different rotation speed. (b), (d) and (f) are the K-L plots of the corresponding catalysts at different potentials.
Figure S9. Chronoamperometric responses of BA@NGMnO$_x$/8, TMA@NGMnO$_x$/6 and 20% Pt/C catalysts at -0.22 V in O$_2$ saturated 0.1 M KOH, which are normalised to initial current responses.

Figure S10. LSV curves of TMA@NGMnO$_x$/2, TMA@NGMnO$_x$/6, TMA@NGMnO$_x$/8 and TMA@NGMnO$_x$/12 catalysts on RDE in O$_2$ saturated 0.1 M KOH solution with a rotation speed of 1600 rpm at a scan rate of 10 mV s$^{-1}$.

Figure S11. (a) Cyclic voltammetry study (b) LSV plots at a rotation speed of 1600 rpm for 0.5TMA@NGMnO$_x$/4, 0.5TMA@NGMnO$_x$/8 and 0.5TMA@NGMnO$_x$/12 nanohybrids, obtained from O$_2$ saturated 0.1 M KOH solution at a scan rate of 10 mV/sec.
**Figure S12.** LSV curves of BA@NGMnO$_x$/2, BA@NGMnO$_x$/6, BA@NGMnO$_x$/8 and BA@NGMnO$_x$/12 catalysts on RDE in O$_2$ saturated 0.1 M KOH solution with a rotation speed of 1600 rpm at a scan rate of 10 mV/sec.