Electronic Supporting Information

Microwave-assisted synthesis of porous Mn_2O_3 nanoballs as bifunctional electrocatalyst for oxygen reduction and evolution reaction

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In practice, the RDE methodology has been highly variable across laboratories, with up to 20% differences in values of mass activity in area-specific activity reported from the same standard Pt/C electrocatalyst which dominated by various experimental in the RDE protocol include the ink formulation, electrocatalyst film quality and the electrochemical procedures. We have tried to provide the comparison (e.g. in terms of catalytic activity) of the synthesized Mn_2O_3 nanoballs to the similar work done in the same field. However, it is important to be noted that there are few reports available in the literature and in fact, the electrochemical ORR and OER of Mn_2O_3 have not been well explored. A comparative table (see below) has been added in SI (Table S1).

Table S1: Comparative values of Kinetic parameters for the ORR. Considering potentials at current on-set, current densities (j) corresponding mass activities (MA).

Electrode	Onset potential V/Ag/AgCl	No. e− from KL plot	Half-wave potential ($E_{1/2}$) (V)	J /mA cm^{-2} geom.	MA (mA/mg)	Reference
Mn_2O_3	-0.15	3.8	-0.29	0.536	6.1	*This work*
Cu-Mn_2O_3	-0.12	3.9	-0.25 V	5.36	18.9	*This work*
Mn_2O_3/C	-	3.9	-	1.66	26.6	*ACS Applied Material & Interfaces, 2009, 1, 460*
Mn_3O_4/N-rGO	-0.075	3.7	-	1.99	-	*ACS Applied Material & Interfaces, 2014, 6, 2692.*
MnO_x/C	0.1	2.8	-	-	60	*J. Phys. Chem. C 2012, 116, 11032.*
α MnO_2	0.1	3.6	-	3.3	-	*Chem Mater. 2010, 22, 898.*
β MnO_2	−0.45	3.7	-	3.87	-	*Chem Mater. 2010, 22, 898.*
γ MnO_2	−0.45	3.7	-	4.0	-	*Chem Mater. 2010, 22, 898.*
Cu-α MnO_2	−0.10	3.20	−0.292	-	-	J. Phys. Chem. C 2014, 118, 17342.
Ag/C	0.023	3.5	-	-	7.6	J. Phys. Chem. C 2012, 116, 11032.
Pt/C	0.13	4	-	-	136	*J. Phys. Chem. C 2012,116, 11032.*