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Article

Solid-State Ball-Milling of Co_3O_4 Nano/Microspheres and Carbon Black Endorsed $LaMnO_3$ Perovskite Catalyst for Bifunctional Oxygen Electrocatalysis

Chelladurai Karuppiah [1], Balamurugan Thirumalraj [2], Srinivasan Alagar [3], Shakkthivel Piraman [3], Ying-Jeng Jame Li [4] and Chun-Chen Yang [1,4,5,*]

Battery Research Center of Green Energy, Ming Chi University of Technology, New Taipei City 24301, Taiwan; kcdurai.rmd@gmail.com
[2] Department of Energy & Mineral Resources Engineering, Sejong University, Seoul 05006, Korea; balachem01@gmail.com
[3] Sustainable Energy and Smart Materials Research Lab, Department of Nanoscience and Technology, Alagappa University, Karaikudi 630002, India; sbn.chem@gmail.com (S.A.); apsakthivel@yahoo.com (S.P.)
[4] Department of Chemical Engineering, Ming Chi University of Technology, New Taipei City 24301, Taiwan; yjli@mail.mcut.edu.tw
[5] Department of Chemical and Materials Engineering, Chang Gung University, Taoyuan 33302, Taiwan.
* Correspondence: ccyang@mail.mcut.edu.tw

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Particle size distribution analysis

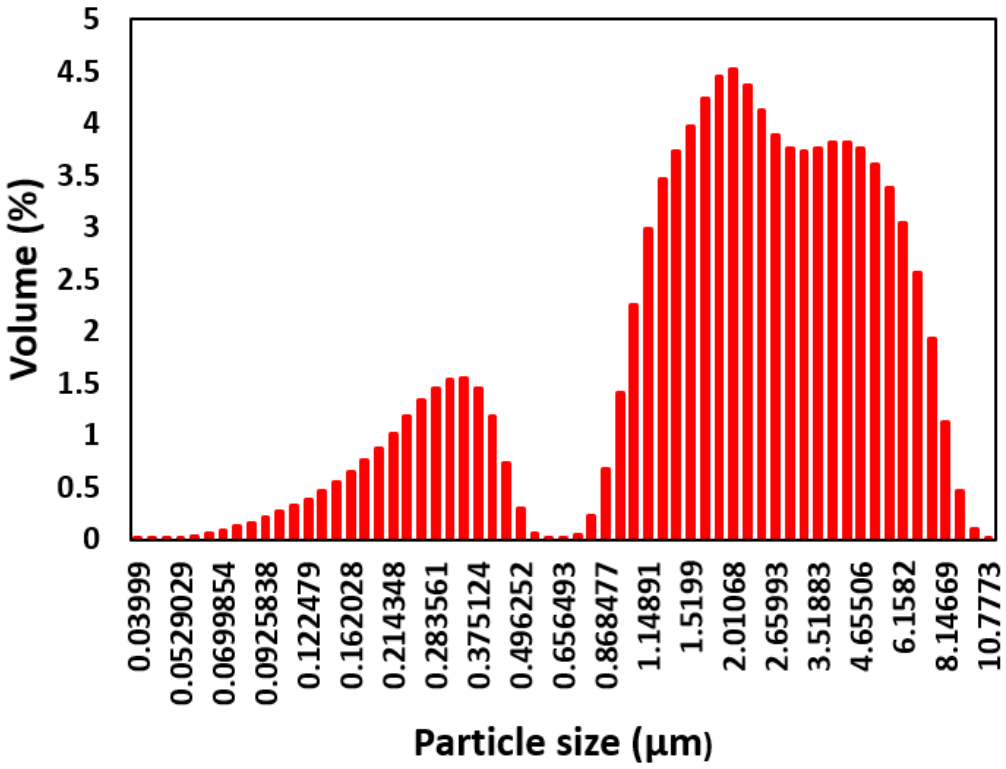

Figure S1: Particle size distribution curve of Co_3O_4 sample.

Table S1.: Elemental carbon content analysis in composite sample.

Sample	Weight-1 (mg)	Weight-2 (mg)	Carbon content-1 (wt.%)	Carbon content-1 (wt.%)	Average carbon content (wt.%)
$LaMnO_3$@C-Co_3O_4 composite	0.85	1.04	4.23	4.02	4.13

XPS analysis

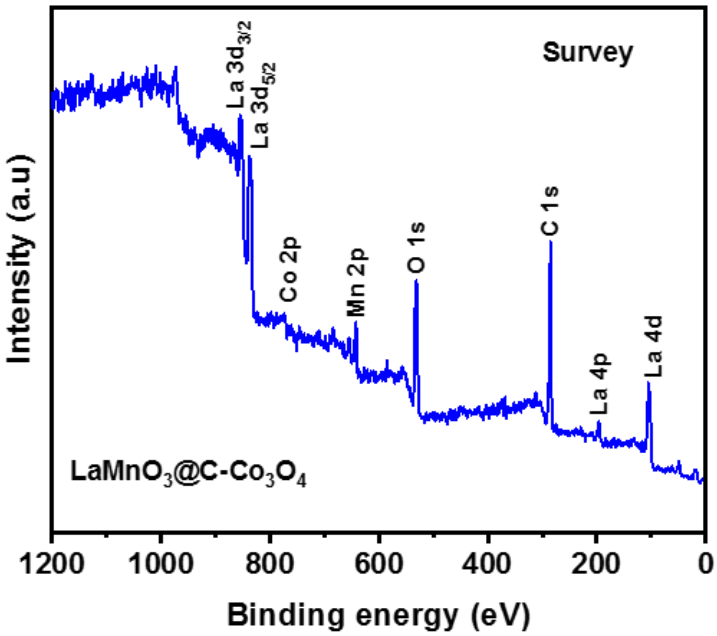

Figure S2: XPS survey spectrum of $LaMnO_3$@C-Co_3O_4 composite sample.

Table S2. Summary of XPS fit parameters.

Core line	Binding energy (eV)	FWHM (eV)	Area (cts. eV/s)	%G-L (%)
La $3d_{5/2}$				
Peak-1	834.62	2.67	1948.32	30
Peak-2	838.15	3.07	2305.20	30
Mn $2p_{3/2}$				
Mn^{3+}	641.84	2.68	591.23	30
Mn^{4+}	643.21	2.35	267.43	30
Co $2p_{3/2}$	778.61	-	-	-
O 1s				
Peak-1	529.60	1.08	481.47	30
Peak-2	531.17	1.88	390.22	30
Peak-3	532.34	1.66	603.37	30
Peak-4	533.89	1.30	254.90	30

Stability of electrode by confirming with SEM analysis after chronoamperometry test

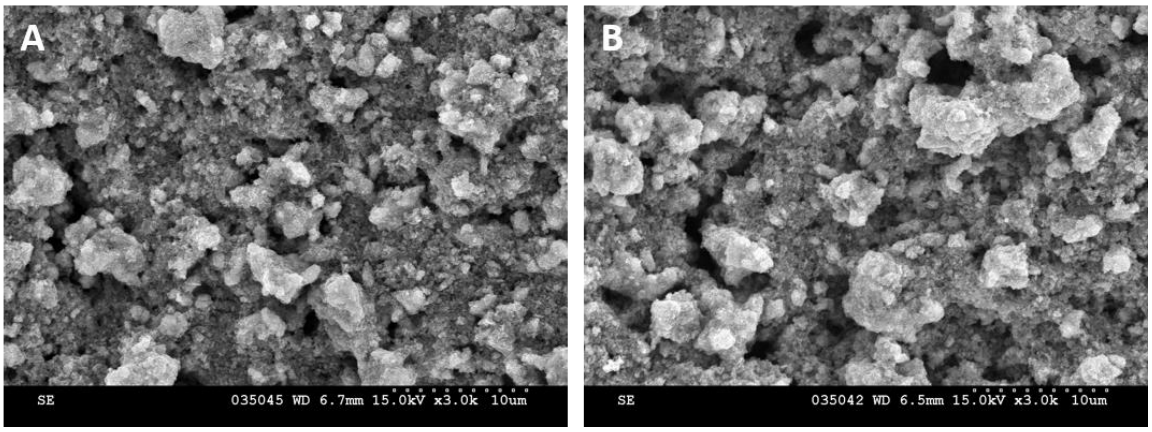

Figure S3. SEM images of $LaMnO_3$@C-Co_3O_4 composite electrode before (**A**) and after (**B**) chronoamperometry test.