

Supplementary Information

Green Synthesis of Flowerball-Like MoS₂/VC Nanocomposite and Its Efficient Catalytic Performance for Oxygen Reduction Either in Alkaline or Acid Media

Xiaofeng Zhang ¹, Yayun Ke ¹, Ting Wang ¹, Jiannan Cai ¹, Qiufeng Huang ¹ and Shen Lin ^{2,3,*}

¹ College of Chemistry and Materials Science, Fujian Normal University, Fuzhou 350007, Fujian, China; xfx_fz@163.com (X.Z.); keyy1058@163.com (Y.K.); wt071421@163.com (T.W.); asw19931126@163.com (J.C.); qiufenghuang@fjnu.edu.cn (Q.H.)

² Fujian Provincial Key Laboratory of Polymer Materials, Fuzhou 350007, Fujian, China

³ Fujian Provincial Key of Advanced Materials Oriented Chemical Engineering, Fuzhou 350007, Fujian, China

* Correspondence: shenlin@fjnu.edu.cn

Citation: Zhang, X.; Ke, Y.; Wang, T.; Cai, J.; Huang, Q.; Lin, S. Green Synthesis of Flowerball-like MoS₂/VC Nanocomposite and Its Efficient Catalytic Performance for Oxygen Reduction Either in Alkaline or Acid Media. *Catalysts* **2022**, *12*, 259. <https://doi.org/10.3390/catal12030259>

Academic Editors: Vincenzo Vaiano and Olga Sacco

Received: 27 January 2022

Accepted: 21 February 2022

Published: 25 February 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

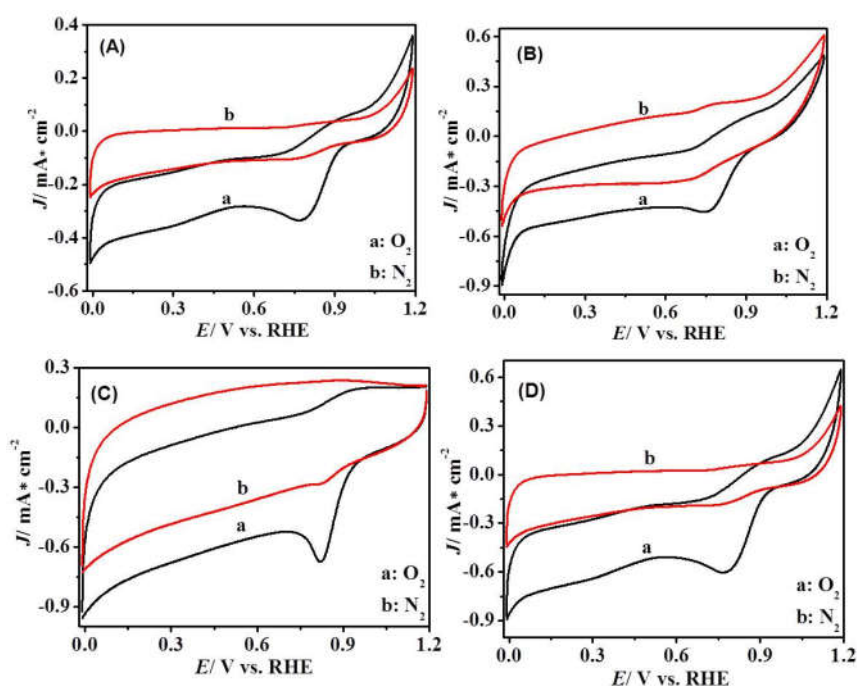


Figure S1. Cyclic voltammograms of (A) MoS₂/C-15, (B) MoS₂/C-20, (C) MoS₂/C-25 and (D) MoS₂/C-30 in N₂ and O₂-saturated 0.1 M KOH solution. Scan rate: 30 mV s⁻¹.

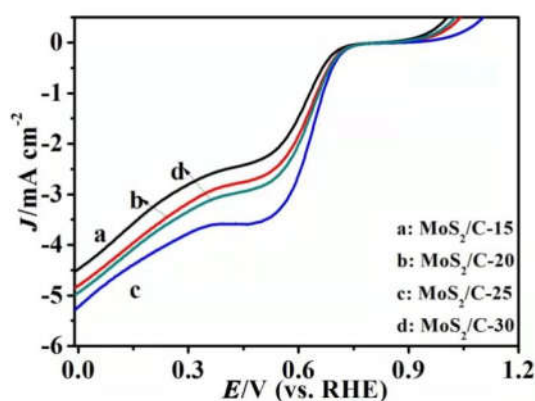


Figure S2. ORR polarization curves of different modified electrode: (a) MoS₂/C-15, (b) MoS₂/C-20, (c) MoS₂/C-25 and (d) MoS₂/C-30 in O₂-saturated 0.1 M KOH solution at 1600 rpm rotation rate; scan rate: 10 mV s⁻¹.

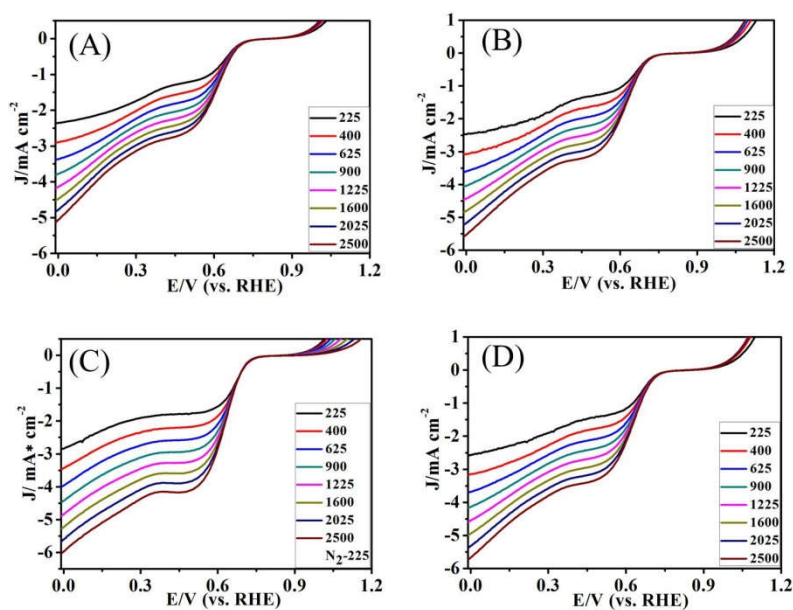


Figure S3. LSV curves of the MoS₂/C-15 (A), MoS₂/C-20 (B), MoS₂/C-25 (C) and MoS₂/C-30 (D) in O₂-saturated 0.1 M KOH solution at different rotation rates; scan rate: 10 mV s⁻¹.

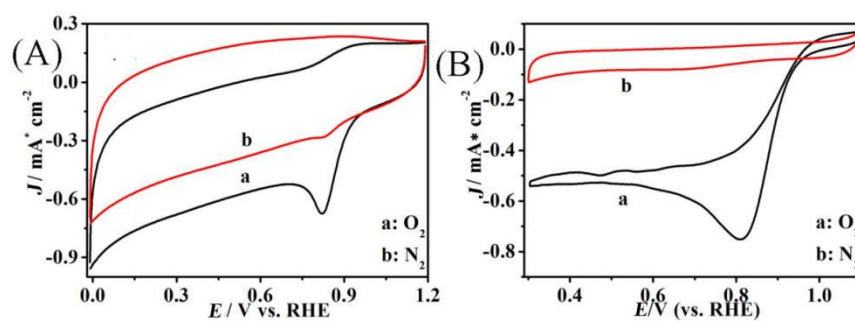
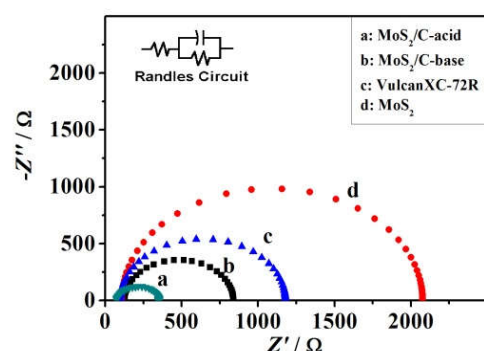
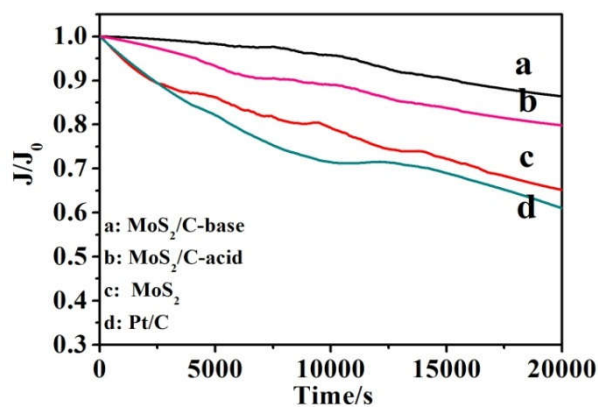


Figure S4. CVs of MoS₂/C-25 in different solution: (A) O₂-saturated 0.1 M KOH solution; (B) O₂-saturated 0.1 M HClO₄ solution. Scan rate: 30 mV s⁻¹.

Table S1. Comparison of the performance of MoS₂-based electrocatalysts for ORR.

Catalyst	electrolyte	ORR onset /V	$J_L/mAcm^{-2}$	n	Ref. ^a
MoS ₂ /NG	0.1 M KOH	-0.12 (vs. SCE)	~ 4.01	3.75-3.90	Ref.15
MoS ₂ /graphene	0.1 M KOH	0.91 (vs. RHE)	~ 4.56	3.8	Ref.11
MoS ₂ @NSC	0.1 M KOH	0.93 (vs. RHE)	~ 4.30	4.12-4.15	Ref.27
MoS ₂ -CNT	0.1 M KOH	-0.35(vs.Ag/AgCl)	~ 5.51	~ 4	Ref.28
Flowerball-like MoS ₂ /VC	0.1 M KOH and 0.1 M HClO ₄	0.82 (vs. RHE) 0.90 (vs. RHE)	~ 5.34 ~ 7.39	3.90 3.98	This work This work

^a Ref. 11, 15, 27, 28 are the cited references in the main text.

**Figure S5.** Nyquist plots of the different modified electrodes: (a) MoS₂/C in 0.1 M HClO₄ solution, (b) MoS₂/C, (c) VulcanXC-72R and (d) MoS₂ in 0.1 M KOH solution.**Figure S6.** Chronoamperometric curves of different modified electrodes: (a) MoS₂/C-base, (b) MoS₂/C-acid, (c) MoS₂ and (d) Pt/C in O₂-saturated 0.1 M KOH/0.1 M HClO₄ solution for 20 000 s.