

Accepted Manuscript

Accelerating oxygen evolution reaction via sodium extraction of $\text{Na}_{0.71}\text{CoO}_2$

Guopeng Wang, He Yang, Jian Guan, Daoming Huan, Yu Liu, Honglei Cai, Ranran Peng, Yalin Lu



PII: S0013-4686(18)30390-6

DOI: [10.1016/j.electacta.2018.02.095](https://doi.org/10.1016/j.electacta.2018.02.095)

Reference: EA 31290

To appear in: *Electrochimica Acta*

Received Date: 29 August 2017

Revised Date: 24 January 2018

Accepted Date: 18 February 2018

Please cite this article as: G. Wang, H. Yang, J. Guan, D. Huan, Y. Liu, H. Cai, R. Peng, Y. Lu, Accelerating oxygen evolution reaction via sodium extraction of $\text{Na}_{0.71}\text{CoO}_2$, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.02.095.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Accelerating Oxygen Evolution Reaction via Sodium Extraction of Na_{0.71}CoO₂

Guopeng Wang,¹ He Yang,¹ Jian Guan,¹ Daoming Huan,¹ Yu Liu,¹ Honglei Cai,¹ Ranran Peng,^{1,2,3,4*} Yalin Lu^{1,2,3,4}

¹CAS Key Laboratory of Materials for Energy Conversion, Department of Materials Science and Engineering, University of Science and Technology of China, Hefei 230026, P. R. China

²Hefei National Laboratory for Physical Sciences at Microscale, University of Science and Technology of China, Hefei 230026, P. R. China

³Synergetic Innovation Center of Quantum Information & Quantum Physics, University of Science and Technology of China, Hefei, Anhui 230026, China

⁴National Synchrotron Radiation Laboratory, University of Science and Technology of China, Hefei 230026, P. R. China

ABSTRACT: Developing efficient and cost-effective electrocatalysts to accelerate the sluggish kinetics of the oxygen evolution reaction (OER) is of great importance to emerging renewable energy technologies. In this work, a chemical sodium extraction of Na from low-cost Na_{0.71}CoO₂ electrocatalyst was demonstrated as an effective way to enhance its catalytic activity and durability toward enhancing OER. By continuously extracting sodium ions out of Na_{0.71}CoO₂ for 2 days, a low overpotential η (0.44 V) at 10 mA cm⁻², a good mass activity (65.93 mA mg⁻¹) and a small Tafel slope (55 mV dec⁻¹) were achieved, which are superior to those of using precious metal oxide IrO₂. XPS measurements and BET surface areas investigations suggest that the dramatic improved OER performance should be ascribed to several major factors, including formed Co⁴⁺ ions oxidized from Co³⁺, increased surface oxygen vacancies and enlarged specific surface areas occurred during the Na extraction process. The research here highlights the importance of tuning cation deficiency in Na-based oxides for further designing advanced OER electrocatalysts.

Key words: OER, Structure Engineering, Na-based, Electrocatalysts

Download English Version:

<https://daneshyari.com/en/article/6603810>

Download Persian Version:

<https://daneshyari.com/article/6603810>

[Daneshyari.com](https://daneshyari.com)