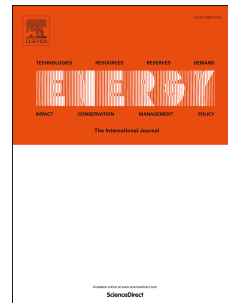


Accepted Manuscript

Nitrogen and cobalt-doped porous biocarbon materials derived from corn stover as efficient electrocatalysts for aluminum-air batteries

Zhenning Liu, Zhiyuan Li, Jian Ma, Xu Dong, Wen Ku, Mi Wang, Hang Sun, Song Liang, Guolong Lu



PII: S0360-5442(18)31472-5

DOI: [10.1016/j.energy.2018.07.175](https://doi.org/10.1016/j.energy.2018.07.175)

Reference: EGY 13440

To appear in: *Energy*

Received Date: 2 February 2018

Revised Date: 23 July 2018

Accepted Date: 26 July 2018

Please cite this article as: Liu Z, Li Z, Ma J, Dong X, Ku W, Wang M, Sun H, Liang S, Lu G, Nitrogen and cobalt-doped porous biocarbon materials derived from corn stover as efficient electrocatalysts for aluminum-air batteries, *Energy* (2018), doi: 10.1016/j.energy.2018.07.175.

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.

1 Manuscript draft to: Energy
2 Article Type: Full Length Article
3 Submission date: 2018-01-30

4 **Nitrogen and cobalt-doped porous Biocarbon Materials**
5 **Derived from Corn Stover as Efficient Electrocatalysts for**
6 **Aluminum-air Batteries**

7 Zhenning Liu, Zhiyuan Li, Jian Ma, Xu Dong, Wen Ku, Mi Wang, Hang Sun, Song
8 Liang, Guolong Lu*

9 Key Laboratory of Bionic Engineering (Ministry of Education), College of Biological and Agricultural
10 Engineering, Jilin University, Changchun, Jilin Province, 130022, P. R. China.

11

12 Corresponding author:

13 * E-mail: Guolong Lu, Guolonglu@jlu.edu.cn.

14 **Abstract**

15 Development of convenient, economic and large scale catalysts for oxygen reduction reaction
16 (ORR) in alkaline medium is of great significance to practical applications of aluminum-air
17 batteries. Herein, a corn-stover-derived, nitrogen and cobalt co-doped porous biocarbon material
18 has been prepared and utilized as ORR catalysts in aluminum-air batteries. The resultant product
19 (NCAC-Co) exhibits an interconnected hierarchical porous structure with a high specific surface
20 area ($1877.3 \text{ m}^2 \text{ g}^{-1}$). The electrocatalytic characterization of NCAC-Co reveals a half-wave
21 potential (0.743V vs. RHE) only slightly lower than that of commercial Pt/C (0.793 V vs. RHE) in
22 alkaline medium. Moreover, NCAC-Co also demonstrates the mechanism of 4-electron oxygen
23 reduction ($n=3.87$) and outstanding durability. The excellent ORR performance of NCAC-Co can
24 be attributed to the presence of pyridinic N, graphitic N and Co nanoparticles as well as the
25 interconnected hierarchical porous structure. More importantly, NCAC-Co also delivers a good
26 behavior when applied in aluminum-air batteries. The work presented herein shows the NCAC-Co
27 derived from corn stover holds good promise to be an alternative of economic and large scale
28 catalysts for metal-air batteries.

29

30 *Keywords: electrocatalyst, oxygen reduction reaction, aluminum-air battery, biomass, porous*
31 *carbon materials*

32

Download English Version:

<https://daneshyari.com/en/article/8070782>

Download Persian Version:

<https://daneshyari.com/article/8070782>

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