

## Accepted Manuscript

### Rational Design of Hollow N/Co-Doped Carbon Spheres from Bimetal-ZIFs for High-Efficiency Electrocatalysis

Xiaodong Chen, Kui Shen, Junying Chen, Binbin Huang, Danni Ding, Lei Zhang, Yingwei Li

PII: S1385-8947(17)31366-9  
DOI: <http://dx.doi.org/10.1016/j.cej.2017.08.024>  
Reference: CEJ 17475

To appear in: *Chemical Engineering Journal*

Received Date: 2 April 2017  
Revised Date: 24 July 2017  
Accepted Date: 7 August 2017

Please cite this article as: X. Chen, K. Shen, J. Chen, B. Huang, D. Ding, L. Zhang, Y. Li, Rational Design of Hollow N/Co-Doped Carbon Spheres from Bimetal-ZIFs for High-Efficiency Electrocatalysis, *Chemical Engineering Journal* (2017), doi: <http://dx.doi.org/10.1016/j.cej.2017.08.024>

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.



## Rational Design of Hollow N/Co-Doped Carbon Spheres from Bimetal-ZIFs for High-Efficiency Electrocatalysis

Xiaodong Chen, Kui Shen,\* Junying Chen, Binbin Huang, Danni Ding, Lei Zhang and Yingwei Li\*

State Key Laboratory of Pulp and Paper Engineering, School of Chemistry and Chemical Engineering, South China University of Technology, Guangzhou 510640, People's Republic of China.

\* Corresponding author. Email: cekshen@scut.edu.cn (K. S.), liyw@scut.edu.cn (Y. L.)

### Abstract

To explore efficient non-noble metal-based electrocatalysts for oxygen reduction reaction (ORR), herein we developed a facile bottom-up approach for the fabrication of a hollow porous carbon sphere codoped with ultra-small Co nanoparticles and uniform nitrogen distribution (Co-HNCS) *via* one-step pyrolysis of a core-shell type precursor composing of polystyrene (PS) core and bimetallic ZIF (zeolite imidazolate framework) shell. The bimetallic Co-Zn-ZIFs (BMZIFs) was selected as the sacrifice template due to not only its high nitrogen content and regular porosity but also the superiority that Zn species in BMZIFs can both spatially separate Co species to suppress the aggregation of ultra-small Co NPs and be evaporated to afford extra pores during high-temperature pyrolysis. As expected, by adjusting the starting molar ratio of Zn to Co, we were able to prepare Co-HNCS- $x$  ( $x$  represent the molar ratio of Co to total starting metal feeding) that exhibited unique hollow structure with large surface areas, enhanced mass transport, high porosities, tunable particle sizes and graphitization degrees, abundant highly active CoN<sub>x</sub> sites, and thus significantly improved ORR performance. Particularly, the optimal Co-HNCS-0.2 exhibited the remarkable ORR activity (the onset and half-wave potentials were 0.94 and 0.82 V vs. RHE, respectively) *via* an efficient four-electron-

Download English Version:

<https://daneshyari.com/en/article/4762950>

Download Persian Version:

<https://daneshyari.com/article/4762950>

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