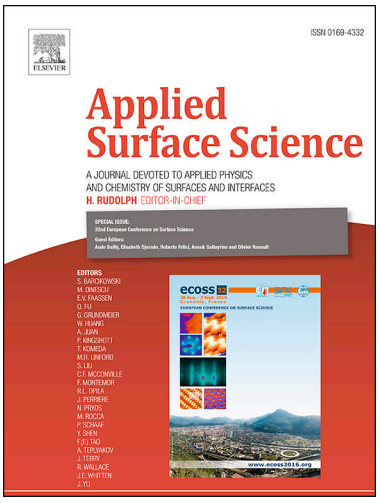
Accepted Manuscript



Full Length Article

N-enriched multilayered porous carbon derived from natural casings for high-performance supercapacitors

Zongying Xu, Yu Li, Dandan Li, Dawei Wang, Jing Zhao, Zhifeng Wang, Mohammad N. Banis, Yongfeng Hu, Huaihao Zhang

PII: S0169-4332(18)30770-0
DOI: https://doi.org/10.1016/j.apsusc.2018.03.100
Reference: APSUSC 38848

To appear in: *Applied Surface Science*

Received Date: 15 December 2017
Revised Date: 5 March 2018
Accepted Date: 12 March 2018

Please cite this article as: Z. Xu, Y. Li, D. Li, D. Wang, J. Zhao, Z. Wang, M.N. Banis, Y. Hu, H. Zhang, N-enriched multilayered porous carbon derived from natural casings for high-performance supercapacitors, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.03.100

N-enriched multilayered porous carbon derived from natural casings for high-performance supercapacitors

Zongying Xu [a], Yu Li [a], Dandan Li [a], Dawei Wang [a], Jing Zhao [a,*], Zhifeng Wang [a], Mohammad N. Banis [b], Yongfeng Hu [b], Huaihao Zhang [a,*]

[a] School of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225002, PR China

[b] Canadian Light Source, 44 Innovation Boulevard, Saskatoon, SK S7N 2V3, Canada

Abstract: In this study, N-enriched multilayered porous activated carbon (LPAC), using natural casings as precursor, was fabricated by a facile carbonization and subsequent KOH activation procedure. The influence of the mass ratio of KOH to carbonized material on pore-structure and surface element composition of LPACs was investigated by a variety of means, such as SEM, HRTEM, BET, Raman, XRD, XPS and XAS. Owing to the unique multilayered texture and nitrogen (N) and oxygen (O) rich feature of natural casings, the resulting LPACs possess interconnected and developed porous structure with N- and O-enriched functional groups, contributing to larger pseudocapacitance. With the rise of mass ratio, the specific surface area (SSA) and average pore size of LPACs increased. The final materials were endowed with a desirable SSA (3100 $m^2 \cdot g^{-1}$) and high N content (6.34 at%). Meanwhile, N- and O-enriched LPAC-4 exhibited a high specific capacitance (307.5 $F \cdot g^{-1}$ at a current density of 0.5 $A \cdot g^{-1}$ in 6 M KOH aqueous solution), excellent rate performance (63.4% capacitance retention at 20 $A \cdot g^{-1}$) and good cycling stability (7.1% capacitance loss