

Accepted Manuscript

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PII: S0013-4686(17)32687-7

DOI: [10.1016/j.electacta.2017.12.122](https://doi.org/10.1016/j.electacta.2017.12.122)

Reference: EA 30910

To appear in: *Electrochimica Acta*

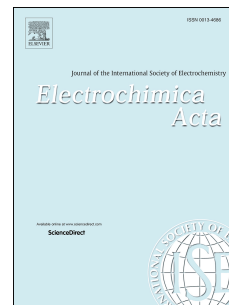
Received Date: 16 August 2017

Revised Date: 20 November 2017

Accepted Date: 17 December 2017

Please cite this article as: Y. Zhu, S. Qiu, F. Ma, G. Li, F. Deng, Y. Zheng, Melamine-derived carbon electrode for efficient H₂O₂ electro-generation, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2017.12.122.

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Melamine-derived Carbon Electrode for Efficient H₂O₂ Electro-generation

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Abstract: A facile one-step fabrication of a highly porous nitrogen-enriched graphitic carbon (NGC) cathode derived from melamine was proposed. It was the very first time for the NGC cathode to be used in the electro-Fenton (EF) process for evaluating electro-generated H₂O₂. The surface characteristics of melamine carbonized at different temperature (NGC-800, NGC-850 and NGC-900) were systematically investigated, including the microstructure, composition, electrochemical properties by the methods of scanning electron microscopy (SEM), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Cyclic voltammetry (CV) and Electrochemical impedance spectroscopy (EIS). Results showed that NGC samples carbonized at different temperature were highly porous with a micrometer size of skeletons (1.5-2.2 μm). Considering the H₂O₂ ability, NGC-900 was most efficient cathode in electro-generated H₂O₂ with a H₂O₂ concentration of 87.19 μmol/L (add H₂O₂ concentration) among NGC-800, NGC-850 and NGC-900. Moreover, the high efficient H₂O₂ generation ability kept stable in a wide pH range from 3 to 9. Combined the technologies, including XPS and electrochemical technologies CV, the high efficient H₂O₂ capacity attributed to the pyrrolic N structure, together with the improved electroconductivity. Therefore, the simple fabrication approach for melamine-derived carbon cathode is a promising low-cost cathode for EF.

Keywords: Nitrogen-carbon material, Pyrrolic N, Hydrogen peroxide, Electro-Fenton,

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