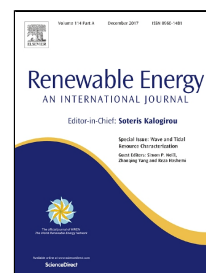


Accepted Manuscript

Application of a non-noble Fe-N-C catalyst for oxygen reduction reaction in an alkaline direct ethanol fuel cell

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PII: S0960-1481(17)30820-0
DOI: 10.1016/j.renene.2017.08.062
Reference: RENE 9160
To appear in: *Renewable Energy*
Received Date: 17 March 2017
Revised Date: 18 August 2017
Accepted Date: 23 August 2017

Please cite this article as: Luigi Osmieri, Ricardo Escudero-Cid, Alessandro H.A. Monteverde Videla, Pilar Ocón, Stefania Specchia, Application of a non-noble Fe-N-C catalyst for oxygen reduction reaction in an alkaline direct ethanol fuel cell, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.08.062

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1 **Application of a non-noble Fe-N-C catalyst for oxygen reduction reaction in an alkaline direct**
2 **ethanol fuel cell.**

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12
13 **Abstract**

14 A Fe-N-C non-noble metal (NNM) catalyst for oxygen reduction reaction (ORR) catalyst was
15 prepared via hard templating method using Fe(II)-phthalocyanine. Its electrochemical behavior
16 towards the ORR was tested in alkaline conditions using cyclic voltammetry (CV) and rotating disk
17 electrode (RDE) techniques. The kinetics of the reduction of the adsorbed oxygen, the selectivity,
18 and the activity towards hydrogen peroxide reduction reaction (HPRR), were investigated. The
19 ethanol tolerance and the stability in alkaline conditions were also assessed with the purpose to
20 verify the good potentiality of this catalyst to be used in an alkaline direct ethanol fuel cell (DEFC).
21 The results evidence that the ORR occurs mainly following the direct 4 e⁻ reduction to OH⁻, and
22 that the-Fe-N-C catalysts is highly ethanol tolerant with a promising stability. The alkaline DEFC
23 tests, performed after the optimization of the ionomer amount used for the preparation of the
24 catalyst ink, show good results at low-intermediate currents, with a maximum power density of 62
25 mW cm⁻². The initial DEFC performance can be partially recovered after a purge-drying procedure.

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