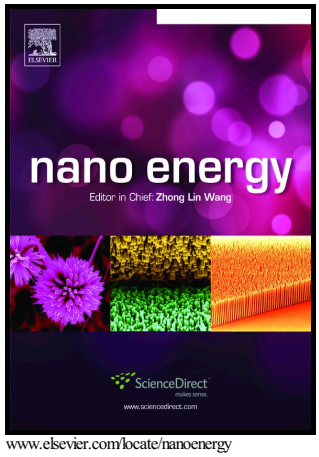

www.elsevier.com/locate/nanoenergy

Designing of stable and highly efficient ordered Pt_2CoNi ternary alloy electrocatalyst: The origin of dioxygen reduction activity

Moorthi Lokanathan, Indrajit M. Patil, M. Navaneethan, Vanshree Parey, Ranjit Thapa, Bhalchandra Kakade

PII: S2211-2855(17)30729-2
DOI: https://doi.org/10.1016/j.nanoen.2017.11.041
Reference: NANOEN2342

To appear in: *Nano Energy*

Received date: 13 August 2017
Revised date: 23 October 2017
Accepted date: 17 November 2017

Cite this article as: Moorthi Lokanathan, Indrajit M. Patil, M. Navaneethan, Vanshree Parey, Ranjit Thapa and Bhalchandra Kakade, Designing of stable and highly efficient ordered Pt_2CoNi ternary alloy electrocatalyst: The origin of dioxygen reduction activity, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2017.11.041

Designing of stable and highly efficient ordered Pt_2CoNi ternary alloy electrocatalyst: The origin of dioxygen reduction activity

Moorthi Lokanathan[a,b], Indrajit M. Patil[a,c], M. Navaneethan[d], Vanshree Parey[a], Ranjit Thapa[a,b*], Bhalchandra Kakade[a,c*]

[a]SRM Research Institute, SRM University, Kattankulathur - 603203, Tamil Nadu, India.

[b] Department of Physics and Nanotechnology, SRM University, Kattankulathur - 603 203, Tamil Nadu, India.

[c]Department of Chemistry, SRM University, Kattankulathur - 603 203, Tamil Nadu, India.

[d]Research Institute of Electronics, Shizuoka University, 3-5-1 Johoku, Naka-Ku, Hamamatsu, Shizuoka 432-8011, Japan.

bhalchandrakakade.a@res.srmuniv.ac.in

ranjit.t@res.srmuniv.ac.in

** Corresponding author email address:*

Abstract

We report an ordered Pt_2CoNi ternary alloy nanoelectrocatalyst, synthesized via simple molten salt synthesis (MSS) procedure and also defined theoretically a new descriptor to explain the origin of exceptional oxygen reduction reaction (ORR) activity. The catalyst consists of a very thin layer of carbon, since the seed-growth of such ordered Pt_2CoNi nanoelectrocatalyst has been originated through the pores of high surface area carbon during a MSS. Electrocatalytic ORR activity of Pt_2CoNi nanoelectrocatalyst is 5-6 times higher than that of commercial Pt/C catalyst with fascinating stability behavior in acidic media. Most interesting behavior of this Pt_2CoNi has been observed after 15,000 and 25,000 durability cycles, where 16 times activity enhancement is achieved at 0.9 V. Furthermore, after 25,000 cycles, a specific activity of 0.605 mA/cm^2_{Pt} (22