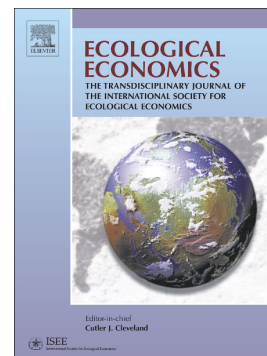


Accepted Manuscript

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PII: S1388-2481(17)30078-4
DOI: doi: [10.1016/j.elecom.2017.03.017](https://doi.org/10.1016/j.elecom.2017.03.017)
Reference: ELECOM 5909
To appear in: *Electrochemistry Communications*
Received date: 28 February 2017
Revised date: 20 March 2017
Accepted date: 22 March 2017

Please cite this article as: Sadia Kabir, Anicet Zadick, Plamen Atanassov, Laetitia Dubau, Marian Chatenet, Stability of carbon-supported palladium nanoparticles in alkaline media: A case study of graphitized and more amorphous supports. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Elecom*(2017), doi: [10.1016/j.elecom.2017.03.017](https://doi.org/10.1016/j.elecom.2017.03.017)

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**Stability of Carbon-Supported Palladium Nanoparticles in Alkaline Media: A Case
Study of Graphitized and More Amorphous Supports**

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Abstract

The stability and degradation mechanism of graphitized (Graphene nanosheets) and more amorphous (Vulcan XC-72R) carbon-supported palladium nanoparticles was investigated. Coupling identical-location transmission electron microscopy (ILTEM) and electrochemistry enabled to correlate the distribution of the Pd nanoparticles under accelerated stress test (up to 1000 cycles between 0.1 and 1.23 V vs. RHE, in a 0.1 M NaOH solution at 25°C) with changes in electrochemical accessible surface area (ECSA). The carbon-supported Pd nanoparticles undergo similar rates of degradation in terms of electrochemical surface areas on both supports. However, their mechanisms of degradation differ: on amorphous carbon, the primary mode of degradation is Pd nanoparticles detachment (and minor agglomeration), whereas on graphitized supports it is more likely their coalescence and dissolution/redeposition. “Bulk” carbon-corrosion is negligible in both cases, as proven by *ex*

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