

Accepted Manuscript

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PII: S0021-9797(18)30722-7
DOI: <https://doi.org/10.1016/j.jcis.2018.06.074>
Reference: YJCIS 23765

To appear in: *Journal of Colloid and Interface Science*

Received Date: 4 May 2018
Revised Date: 25 June 2018
Accepted Date: 25 June 2018

Please cite this article as: Y. Gong, X. Liu, Y. Gong, D. Wu, B. Xu, L. Bi, L. Ying Zhang, X.S. Zhao, Synthesis of defect-rich palladium-tin alloy nanochain networks for formic acid oxidation, *Journal of Colloid and Interface Science* (2018), doi: <https://doi.org/10.1016/j.jcis.2018.06.074>

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Synthesis of defect-rich palladium-tin alloy nanochain networks for formic acid oxidation

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Abstract

Unique and novel Pd₄Sn nanochain networks were successfully synthesized with an average diameter of 5 nm, rendering a modified Pd electronic structure with rich defects such as atomic corners, steps or ledges as catalytic active sites for great enhancement of charge transfer and electrode kinetics. The prepared Pd₄Sn nanochain networks held an electrochemically active surface area as high as 119.40 m² g⁻¹, and exhibited higher catalytic activity and stability toward formic acid oxidation compared with Pd₃Sn nanochain networks, Pd₅Sn nanochain networks, Pd₄Sn dendrites and Pd/C. The fundamental insight of the enhancement mechanism is discussed, and this work offers a novel, less expensive but highly active catalyst for direct formic acid fuel cells.

Keywords: Pd₄Sn nanochain networks; Electrocatalyst; Formic acid oxidation reaction; Active sites; Fuel cells

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