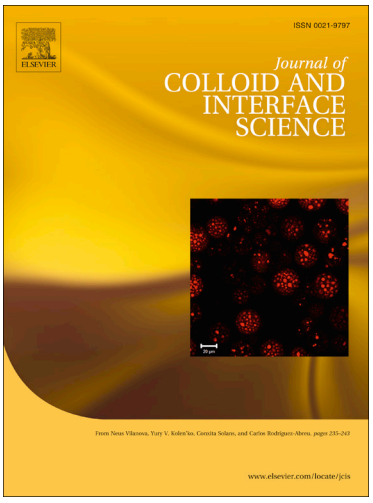

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Synthesis of defect-rich palladium-tin alloy nanochain networks for formic acid oxidation

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Abstract

Unique and novel Pd_4Sn 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 Pd_4Sn nanochain networks held an electrochemically active surface area as high as 119.40 $m^2 g^{-1}$, and exhibited higher catalytic activity and stability toward formic acid oxidation compared with Pd_3Sn nanochain networks, Pd_5Sn nanochain networks, Pd_4Sn 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: Pd_4Sn nanochain networks; Electrocatalyst; Formic acid oxidation reaction; Active sites; Fuel cells