

Pd Catalysts Supported on N-doped Carbon for Formic Acid based Hydrogen Generation System

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Formic acid is one of the most promising chemical hydrogen storage material for large-scale energy storage applications. Herein, we presented the synthesis and characterization of a scalable Pd catalyst supported on nitrogen doped carbon(N-C) via a simple pyrolysis(550°C) of the mixture containing Pd, N, and C atoms. Compared to Pd/C, the resulting Pd/N-C catalyst demonstrated enhancement in catalytic activity for the dehydrogenation of formic acid. The increased activity for Pd/N-C was found to originate from electronic interaction between the incorporated nitrogen atoms and Pd active sites, as evidenced by Xray photoelectron spectroscopy(XPS). Ultimately, a hydrogen generation system fueled by formic acid was designed and further integrated with a polymer electrolyte membrane fuel cell (PEMFC), demonstrating continuous production of the 180 W power over 1h.

Keyword: Pd/N-C, Formic acid, Dehydrogenation, Nitrogen doping, Palladium catalyst, PEMFC