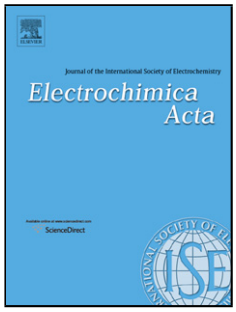

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PII: S0013-4686(14)00944-X
DOI: http://dx.doi.org/doi:10.1016/j.electacta.2014.04.164
Reference: EA 22670

To appear in: *Electrochimica Acta*

Received date: 10-3-2014
Revised date: 25-4-2014
Accepted date: 28-4-2014

Please cite this article as: B. zhao, M. Chen, Q. Guo, Y. Fu, Electrocatalytic hydrogenation of furfural to furfuryl alcohol using platinum supported on activated carbon fibers, *Electrochimica Acta* (2014), http://dx.doi.org/10.1016/j.electacta.2014.04.164

Electrocatalytic hydrogenation of furfural to furfuryl alcohol using platinum supported on activated carbon fibers

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Abstract

In this work, electrocatalytic hydrogenation (ECH) of furfural to furfuryl alcohol was studied. Experiments were run in a H-type cell in aqueous solution with a platinum sheet as anode. Platinum (Pt), nickel (Ni), copper (Cu) and lead (Pb) were used as cathode materials. As expected, the cathode material, which serves as the hydrogenation catalyst, was found to have a large effect on the ECH of furfural. Among the cathode materials studied, the Pt gave the best product selectivity. So cathodic reduction was catalyzed by platinum supported on activated carbon fibers(Pt/ACF), a novel electrocatalyst. Incipient wetness impregnation and electrodeposition methods were employed to prepare the electrocatalyst. Catalysts prepared by impregnation method were more active than prepared using electrodeposition method, presumably because of more active surface area. When using impregnation method, 3%Pt/ACF showed the best activity and current efficiency, followed by 5%Pt/ACF. Effects of electrolyte on product yield and current efficiency were also investigated. The yield of furfuryl alcohol was highest in the 0.1M HCl. The initial furfural concentration and the electrolytic potential also strongly affected the product yield and current efficiency.

Key word: furfural; electrocatalytic hydrogenation; activated carbon fibers.

1.Introduction

Production of chemicals and fuels from abundant, renewable biomass and its derivatives