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YUCOMAT 2022

&

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XII WRTCS

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O.S.II.B.1.

The influence of substrate and thermal annealing on calalytic activity and stability of Pt thin film catalysts

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The electrocatalytic oxidation of small organic molecules, such as methanol, ethanol and formic acid has been extensively studied due to their properties that make them suitable for use in fuel cells. Particularly, the electrochemical oxidation of formic acid has been comprehensively examined as the anodic reaction in direct formic acid fuel cell (DFAFC).
In this study, we have investigated how the change in surface composition of Pt thin film deposited on Ni and Cr supports, induced by the controlled thermal treatment, reflects on catalyst performance for the electrooxidation of formic acid.
The results presented unequivocally show that the exceptional activity for formic acid electrooxidation, measured on annealed Pt/Ni and Pt/Cr catalysts, is a direct consequence of the nature of the substrate which manifests itself after controlled heat treatment trough bifunctional effect at Pt/Ni and through surface reconstruction at Pt/Cr catalyst.
In the case of Pt/Ni catalysts, exactly what makes it active leads to instability, which means that the increase in activity goes at the expense of stability. In contrast, at Pt/Cr catalysts, by using the controlled thermal treatment we increase both activity and stability, and actually to a significant extent for the catalyst annealed to 500 ^{o}C

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