
How to increase the interaction between catalyst and ionomer on nitrogen plasma modified carbons for pemfc

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Résumé

Carbon blacks are conventionally used as electrocatalyst support in proton exchange membrane fuel cells. Vulcan XC72 was doped with nitrogen functionalities by exposing it to nitrogen plasma. The effect on its morphology, structure and texture and surface properties was investigated. In particular, the strength of the interaction between the modified carbon and Nafion® ionomer was evaluated by isothermal titration calorimetry. An enhanced exothermic effect was observed on increasing the amount of nitrogen at the Vulcan surface. The undoped and nitrogen-doped carbon blacks were catalysed with Pt nanoparticles, and the resulting materials were characterised for their electrocatalytic properties towards the oxygen reduction reaction. The electrocatalyst using nitrogen-doped supports are characterised by higher activity and stability, which is attributed to a strong Pt-support interaction promoted by the presence of the heteroatoms.

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