

VANADIUM AND NITROGEN CO-DOPED MULTI-WALLED CARBON NANOTUBE ELECTROCATALYST FOR OXYGEN REDUCTION REACTION

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A new vanadium and nitrogen co-doped carbon catalyst was synthesized as an alternative oxygen reduction electrocatalyst to commercial Pt/C. The vanadyl phthalocyanine (VPc) was mixed with multi-walled carbon nanotubes (MWCNT) and pyrolyzed at 800 °C in N₂ atmosphere. The electrochemical oxygen reduction reaction behavior of V/N/MWCNT catalysts was evaluated with rotating disk electrode (RDE) method. The morphology, chemical composition and structural features of this catalyst were evaluated using scanning and transmission electron microscopies, Raman, X-ray photoelectron spectroscopy and X-ray diffraction analysis. Also, the surface area was measured according to the BET method and it was larger than MWCNT surface area. The catalyst presented properties close to that of commercial Pt/C [1] and superior ORR electrocatalytic activity in alkaline, neutral and acidic media. On this catalyst, the ORR proceeds by a four-electron pathway. The results demonstrate that V/N/MWCNT has a great potential as a non-Pt catalyst for cathode material in metal-air batteries, proton and anion exchange membrane fuel cells [2].

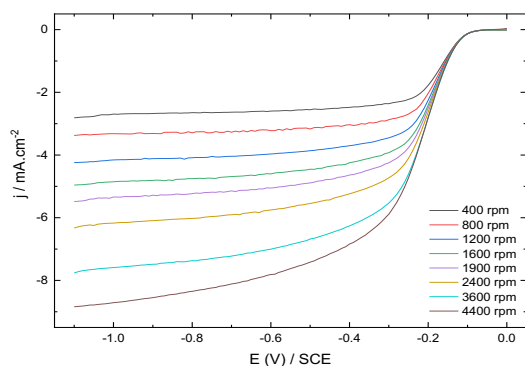


Figure 1. RDE voltammetry curves for ORR on VPc/MWCNT

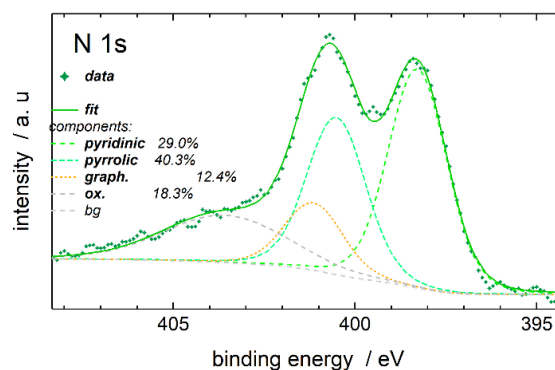


Figure 2. XPS image of V/N/MWCNT catalyst

References

1. J.H. Zagal, I.Kruusenberg, K.Tammeveski, et al. 2018, *Encycl. Interfacial Chem. Surf. Sci. Electrochem.* 812–819.
2. I.Kruusenberg, L.Matisen, K.Tammeveski, 2013, *Int J Electrochem Sci*, 8, 1057–1066.