Polyoxometalate Modified Carbon Supported Pd-Cu Bimetallic Catalyst For Formic Acid Oxidation

Zhiwei Zhu^{1,2}, Chenxi Lu^{1,2}, Jianzhi Wang^{1,2}, Xiaoxiao Zhang^{1,2}, Ning Cai^{1,2}, Yanan Xue^{1,2},
Weimin Chen^{1,2}, Zhiguo Yan^{1,2}, Xiaojun Yang^{1,2}, Faquan Yu^{1,2}, Wei Yang^{1,3,*}, Qifeng Tian^{1,2,*}

¹ Key Laboratory of Green Chemical Process of Ministry of Education & Hubei Key Laboratory of Novel Reactor and Green Chemical Technology (Wuhan Institute of Technology), Wuhan 430205, PR China

² School of Chemical Engineering and Pharmacy, Wuhan Institute of Technology, Wuhan 430205, PR China

³ School of Chemistry and Environmental Engineering, Wuhan Institute of Technology, Wuhan 430205, PR China

*E-mail: qftian@wit.edu.cn (Q. T.), yangweight@126.com (W. Y.)

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Palladium-copper (PdCu) bimetallic alloy nanoparticles were loaded on the polyoxometalate modified carbon supports (PWA-C) to prepare Pd_xCu_y/PWA-C catalyst with different Pd/Cu atomic ratios. Highly dispersion catalyst nanoparticles were obtained and its average particle sizes are in the range of 2.75–4.46 nm. Electrochemical measurements indicated that the formic acid electro-oxidation activities of Pd_xCu_y/PWA-C catalysts were greatly enhanced than the home made Pd/C catalyst. The prepared Pd_xCu_y/PWA-C bimetallic catalyst performed superior electrocatalytic activity and stability than Pd/C catalyst. Among them, Pd₁Cu₂/PWA-C holds the best catalytic performances, whose catalytic activity for formic acid oxidation was improved with a factor of 7.07 as compared to Pd/C catalyst. The outstanding electrocatalytic activity and stability of Pd_xCu_y/PWA-C catalyst may be attributed to the several effects, which include the smaller catalyst nanoparticle, Pd active sites restoring by PWA modification and Cu alloying.

Keywords: Formic acid oxidation, PdCu bimetallic alloy, Electrocatalysis

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