Characterization and Electrocatalytic Properties of the Phosphomolybdate-PAMAM Nanocomposite Film

Daolin Zhu¹, and Shouguo Wu², Yijiang Shao^{1,*}

¹ Department of Biotechnology, Hefei Technology College, Chaohu 238000, P. R. China

² Department of chemistry, University of Science and Technology of China, Hefei, Anhui, 230026, P.R. China

*E-mail: shaoyijiang@126.com

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The phosphomolybdate-PAMAM nanocomposite film was successfully prepared by using a submonolayer of 3-mercaptopropionic acid (3-MPA) adsorbed on a polycrystalline gold electrode further reacted with poly(amidoamine) (PAMAM) dendrimer (generation 4.0) to obtain a film on which 1:12 phosphomolybdate acid (PMo₁₂) was later coordinated to afford a mixed electrocatalytic layer. On the basis of the electrochemical behaviors, atomic force microscopy (AFM) and X-ray photoelectron spectra (XPS), it is suggested that the PMo₁₂ nanoparticles are located within the dendritic structure of the surface attached PAMAM dendrimers. The protonated environment provided by PAMAM not only promises the higher electroactivity of PMo₁₂ at weak acidic condition, but also improves its stability. It was illustrated experimentally that the hybrid film showed a high electrocatalytic activity for reduction of S₂O₈²⁻ and H₂O₂ in the aqueous solution of pH 4.0.

Keywords: Phosphomolybdate acid (PMo₁₂), PAMAM, Nanocomposite, Electrocatalysis, S₂O₈²⁻, H₂O₂.

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