

Electrocatalytic Detection of Hydrogen Peroxide Using Palladium-Nanoparticle Dispersed Carbon Film Electrodes

Osamu Niwa^{1,2,*}, Dai Kato^{1,2}, Ryoji Kurita¹, Tianyan You^{3,**},
Yuzuru Iwasaki^{2,3} and Shigeru Hirono⁴

¹National Institute of Advanced Industrial Science and Technology,
Tsukuba Central 6, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8566, Japan

²JST-CREST, 4-1-8, Honcho, Kawaguchi, Saitama 332-0012, Japan

³NTT Microsystem Integration Laboratories, NTT Corporation,
3-1 Morinosato-Wakamiya, Atsugi, Kanagawa 243-0198, Japan

⁴NTT-Afty Corporation, 2-35-2 Hyoe, Hachioji, Tokyo 192-0918, Japan

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We prepared palladium (Pd)-nanoparticle-dispersed graphitelike carbon (Pd NDC) film by cosputtering Pd and carbon by radio frequency (RF) sputtering. The preparation method is very simple and reproducible, and the Pd content can be well controlled. We studied the film with respect to its structural characterization and electrochemical properties. Transmission electron microscopy (TEM) images show that the structure of the carbon film is graphitelike and that the Pd particles are highly dispersed in the carbon matrix. The Pd nanoparticle size is very uniform with a diameter of about 4 nm, which is larger than that of previously reported platinum nanoparticles formed in graphite-like carbon film. Electrochemical properties, such as the electrocatalytic oxidation of hydrogen peroxide, are studied by cyclic voltammetry and hydrodynamic measurement. The current density of hydrogen peroxide concentration at a Pd NDC film electrode was higher than that at a Pd bulk electrode. As a result, we found that the relationship between hydrogen peroxide and current density at Pd NDC film is much more linear than that at a Pd bulk electrode with high stability.

*Corresponding author: e-mail: niwa.o@aist.go.jp

**Present Address: Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, 5625 Renmin Street, Changchun, 130022 China