Multifunctional electrodeposited copper oxide electrocatalyst for methanol oxidation and oxygen evolution reaction

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Water splitting and methanol oxidation are deemed as effective pathways for producing ideal clean energy or with low emission of pollutant. In this report, Copper oxide (CuO) nanostructures are directly grown on conductive Ni foam substrate by a facile electrodeposition method in addition to a post-annealing process. Oxygen evolution reaction (OER) and methanol oxidation properties of CuO are elucidated by cyclic voltammetry (CV), chronoamperometry (CA), and electrochemical impedance spectroscopy (EIS) measurements. Impressively, the CuO nanostructures exhibits higher electro-catalytic activity, lower over-potential and long-term stability for OER and methanol electro-oxidation compared to other reported Cu based catalysts in alkaline medium. The high electrochemical performance of binder-less CuO on Ni foam is mainly attributed to fast ion/electron transfer and an enhanced electrochemical kinetics. This work was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (NRF 2016R1D1A1B03930855).