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Electrodeposition of ternary BiTePd nanofilm electrocatalyst using surface-limited reaction for direct ethanol fuel cell

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Abstract

Herein, we report electro-synthesis of BiTePd using electrochemical atomic layer deposition (E-ALD). The SEM-EDS, AFM, and XRD were used to characterize Pd-based thin films' surface morphology and structure composition. BiTePd electrocatalyst exhibit higher electrochemical activity, stability, and electron transfer kinetics as compared to its bimetallic counterparts using CV, CA, and Electrochemical impedance spectroscopy (EIS). The higher peak current and more negative onset potential is observed for ternary (BiTePd) nanofilm electrocatalyst towards ethanol oxidation reaction, according to this order: BiTePd = (1.26 mA; -055 V) > TePd = (0.527 mA; -0.535 V) > BiPd = (0.24 mA; -0.39 V) > Pd (0.13 mA; 0.35 V). Moreover, BiTePd = Rct (2.01 kO) gave the faster interfacial charge transfer than TePd = 2.42 kO, BiPd = 3.97 kO and Pd = 14 kO. BiTePd nanofilm demonstrates promising characteristic features of an active electrocatalyst for a direct ethanol fuel cell.