

Perovskite-Type $\text{La}_{1-x}\text{Ca}_x\text{AlO}_3$ ($x=0, 0.2, 0.4, 0.6$) as Active Anode Materials for Methanol Oxidation in Alkaline Solutions

Authors : M. Diafi, M. Omari, B. Gasmi

Abstract : Perovskite-type $\text{La}_{1-x}\text{Ca}_x\text{AlO}_3$ were synthesized at 1000°C by a co-precipitation method. The synthesized oxide powders were characterized by X-ray diffraction (XRD) and the oxide powders were produced in the form of films on pretreated Ni-supports by an oxide-slurry painting technique their electrocatalytic activities towards methanol oxidation in alkaline solutions at 25°C using cyclic voltammetry, chronoamperometry, and anodic Tafel polarization techniques. The oxide catalysts followed the rhombohedral hexagonal crystal geometry. The rate of electro-oxidation of methanol was found to increase with increasing substitution of La by Ca in the oxide matrix. The reaction indicated a Tafel slope of $\sim 2.303RT/F$, The electrochemical apparent activation energy ($[\Delta H]_{el}(\text{e}^\#)$) was observed to decrease on increasing Ca content. The results point out the optimum electrode activity and stability of the Ca is $x=0.6$ of composition.

Keywords : electrocatalysis, oxygen evolution, perovskite-type $\text{La}_{1-x}\text{Ca}_x\text{AlO}_3$, methanol oxidation

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