Synthesis of hydrous cobalt phosphate electrocatalysts by a facile chemical bath deposition method for enhanced oxygen evolution reaction

Sumita S. Patil, Umakant M. Patil*
D. Y. Patil Education Society (Deemed to be University), Kasaba Bawada, Kolhapur 416 006
umakant.physics84@gmail.com

Abstract
In the field of energy conversion and storage, the cost-effective and highly active oxygen evolution reaction (OER) catalysts are in much demand. This study focuses on the synthesis of highly active electrocatalysts in the form of hydrous cobalt phosphate thin films using a low-cost chemical bath deposition (CBD) method at a temperature of 363 K. The influence of varying deposition times for these thin films of hydrous cobalt phosphate on their electrocatalytic performance was investigated. X-ray diffraction analysis was employed to identify the crystal structure formation. The microsheet-like structure of the hydrous cobalt phosphate thin films was revealed through morphological analysis. Remarkable electrocatalytic capabilities of these hydrous cobalt phosphate thin films were observed during the OER, demonstrating a low overpotential of 288 mV at a current density of 10 mA cm^{-2} in a 1.0 M KOH electrolyte. Furthermore, the electrocatalyst's stability was evidenced through continuous electrolysis, indicating that the hydrous cobalt phosphate thin film electrocatalyst maintains superior long-term electrochemical stability for 24 hours at a constant current density of 10 mA cm^{-2}.