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S.M.A. Shibli, A.H. Riyas, M. Ameen Sha, Rajee Mole



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**Tuning of phosphorus content and electrocatalytic character of CeO<sub>2</sub>-RuO<sub>2</sub> composite incorporated Ni-P coating for hydrogen evolution reaction**

S.M.A. Shibli\*, A.H. Riyas, M. Ameen Sha, Rajee Mole

Department of Chemistry, University of Kerala, Kariavattom Campus

Thiruvananthapuram, Kerala- 695 581, India

**ABSTRACT**

The quantity of phosphorus content in Ni-P coating has critical influence on the performance of the coating due to the change in physico-chemical and morphological characteristics. In the present study, CeO<sub>2</sub>-RuO<sub>2</sub> incorporated Ni-P coatings with optimum phosphorus content were developed by electroless nickel plating process. Tuning of the phosphorus content was achieved by varying the amount of sodium hypophosphite added in the reducing Ni-P bath. The prepared composite Ni-P electrode with optimum phosphorus content exhibited good electro catalytic behavior towards alkaline Hydrogen Evolution Reaction (HER) with an appreciable low over potential compared to bare Ni-P and the other composite incorporated Ni-P electrodes. The electrocatalytic behavior was varying depending on morphology and abundance of phosphorus in the electrode. The electrode retained its stability under the reaction conditions. The CeO<sub>2</sub>-RuO<sub>2</sub> incorporated Ni-P exhibited high corrosion potential  $E_{corr} = -0.349$  V and low corrosion current density  $I_{corr} = 12 \mu\text{A}/\text{cm}^2$  than that exhibited by pure Ni-P. Also it exerted low polarization resistance ( $R_p$ ) value of  $6.9216 \times 10^4$  ohm than the pure Ni-P.

Key words: Electroless coating; Corrosion; Ni-P coating; Hydrogen generation.

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\* Author for all correspondence: smashibli@yahoo.com

Phone: +91 471 2308682 (off); +91 471 2167230 (Res); +91 92498 63611 (Mob)

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