

ABSTRACT

*Water electrolysis reaction via hydrogen evolution reaction (HER) is considered a promising approach for the production of high purity hydrogen. Noble metals such as Au are considered as reliable cathode materials for HER because they have good catalytic activity and stability. The CeVO₄ nanoparticles have impressive optical capabilities, electrical functionality, and optimal catalytic cycling. In addition, rare earth metal oxide nanoparticles such as CeO₂ have potential as good electrocatalyst accelerators. Environmentally friendly nanomaterial synthesis methods are needed to overcome the green energy crisis. This research aims to carry out the synthesis, characterization and effectiveness of Au/CeVO₄-CeO₂ nanocomposites using an environmentally friendly method using noni leaf extract (*Morinda citrifolia*) which is applied as a hydrogen evolution reaction (HER) electrode. These Au/CeVO₄-CeO₂ NCs have been successfully synthesized based on characterization results in the form of diffraction patterns (XRD), functional groups (FTIR), element distribution (FE-SEM EDX), binding energy (XPS), and have an average particle size of 14.97 nm (TEM). Electrochemical test results show that the Au/CeVO₄-CeO₂ NCs based electrode has the highest effectiveness with a double layer capacitance (C_{dl}) value of 234.1 mF/cm², specific capacitance (C_s) of 1111.9 mF/g, the lowest overpotential 175 mV, the highest mole of hydrogen gas is 1.89×10^{-4} mol/cm², the lowest Tafel slope is 352 mV/dec, and the lowest charge transfer resistance is 412.11 Ω .*

Keywords: *Morinda citrifolia, Au/CeVO₄-CeO₂, electrocatalyst, electrolysis, hydrogen evolution reaction (HER)*