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ANODIC ALUMINUM OXIDE-SUPPORTED GOLD CATALYST (Au-AAO) FOR *p*-NITROPHENOL REDUCTION

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ABSTRACT

ANODIC ALUMINUM OXIDE-SUPPORTED GOLD CATALYST (Au-AAO) FOR *p*-NITROPHENOL REDUCTION

Anodic aluminum oxide (AAO) demonstrates significant potential as catalyst support due to its strong mechanical properties, excellent thermal stability and adjustable pore size. However, the efficiency of AAO in wire form under similar anodization conditions remains unexplored. This study aims to evaluate the efficiency of AAO in nanoporous membranes and wire forms as a support for gold (Au) for the catalytic reduction of *p*-nitrophenol (*p*-NP). Both AAO forms were fabricated using an electrochemical anodization method with identical anodization parameters (electrolyte, voltage, and temperature) followed by a deposition-precipitation (DP) technique to deposit gold onto the AAO surface producing Au/mAAO and Au/wAAO catalysts. The Au/AAO catalysts were characterized using Fourier Transform Infrared Spectroscopy (FTIR) revealing shifts from 3453 cm^{-1} to 3461 cm^{-1} for Au/mAAO and 3434 cm^{-1} to 3438 cm^{-1} for Au/wAAO correspond to O-H group due to gold attachment. The catalytic activity of Au/mAAO and Au/wAAO were assessed by Ultraviolet-Visible Spectroscopy (UV-Vis), which showed rate constants (k) of 4.24×10^{-3} s^{-1} for Au/mAAO and 4.31×10^{-4} s^{-1} for Au/wAAO. According to the result, Au/mAAO shows better activity for the catalytic reduction of *p*-nitrophenol. It was subsequently analyzed using Field-Emission Scanning Electron Microscopy (FE-SEM). FE-SEM image revealed that Au/mAAO has closely packed and regular-shaped holes with an average AAO pore size of 76.75±11.29 nm and size of Au nanoparticles (NPs) scattered near the pore region had an average size of 16.03±5.54 nm. Hence, future research should focus on developing more efficient catalysts by exploring other AAO structures and utilizing advanced laboratory instruments such as X-Ray Diffraction (XRD) and Inductive Coupled Plasma Optical Emission Spectroscopy (ICP-OES) for characterization.