Fabrication of Tungsten Trioxide-loaded Titania Nanotubes as a Potential Photoanode for Photoelectrochemical Cell

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This study aimed to investigate the effect of deposition potential on the growth of tungsten trioxide electrodeposited onto titania nanotubes (WTNT) in a fixed solution pH of 1.5 as well as its effect on the photoelectrochemical (PEC) properties of titania nanotubes (TNT). Well-ordered crystalline TNT and WTNT were obtained via anodization of titanium foil and electrodeposition of WO₃ species respectively as proven via FESEM, EDX, and XRD analyses. All WTNTs showed enhanced PEC performance compared to the blank TNT. WTNT/−0.65 V prepared under deposition potential at −0.65 V exhibited the highest PEC performance ($\eta = 9.63\%$) compared to other WTNTs and almost 6 times higher compared to blank TNT ($\eta = 1.65\%$). Such enhancement was due to optimal amount and morphology of tungsten trioxide deposited which enabled efficient synergetic effect between tungsten trioxide and TNT.

Keywords: charge transport, electrodeposition, nanocomposites, titania nanotubes, photoelectrochemistry

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