

TiNT/Ti 광아노드의 광전기화학 특성에 미치는 Ni 금속의 영향

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Inverse effect of Nickel modification on photoelectrochemical performance of TiNT/Ti photoanode

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Nanomaterial architecture with highly ordered, vertically oriented TiO₂ nanotube arrays shows a good promise for diverse technological applications. As inspired from the literature reports that Nickel modification can improve the photocatalytic activity of TiO₂, it was planned to coat Ni into the TiO₂ matrix.

In this study, first TiO₂ nanotubes (TiNTs) were prepared by anodization (60V, 3min) in HF-free aqueous electrolyte on ultrasonically cleaned polished titanium sheet substrates (1x7cm²).

The typical thickness of the sintered TiNT (500°C for 10min) was ~1 micronas confirmed from the FESEM study. In the next part, as-anodized and sintered TiNT/Ti photoanodes were used to coat Ni by AC electrodeposition from aqueous 0.1M nickel sulphate solution.

During AC electrodeposition, conditions such as 1V DC offset voltage, 9V amplitude (peak-to-peak) and 750 Hz frequency were fixed constant and the deposition time was varied as 0.5 min, 1 min, 2 min and 10 min.

The photoelectrochemical performance of pristine and Ni modified TiNT/Ti photoanodes was measured in 1N NaOH electrolyte under 1 SUN illumination in the potential range of -1V and 1.2V versus Ag/AgCl reference electrode.

The photocurrent performance of TiNT/Ti photoanode decreased upon Ni modification and the results were confirmed after repeated experiments. This suggests us that Ni modification inhibits the photoelectrochemical performance of TiO₂ nanotubes.

Key words : TiNT(Ti 나노튜브), Photoelectrochemical(광전기화학), Nickel modification(Ni 개질)

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