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Tantalum nitride nanotube photoanodes: establishing a beneficial back-contact by lift-off and transfer to titanium nitride layer

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Abstract

In this work we introduce the use of TiN/Ti₂N layers as a back contact for Ta₃N₅ membranes of lifted-off anodic Ta₃N₅ nanotubular layers. In photoelectrochemical H₂ generation experiments under simulated AM 1.5G light, a shift in the onset potential of anodic photocurrents to lower potentials is observed, as well as a higher magnitude of the photocurrents compared to a conventional Ta₃N₅ nanotubular layer (Ta₃N₅/Ta, ~0.5 V_{RHE}). We ascribe this beneficial effect to the improved conductive properties of the TiN_x-based back contact layer that enables a facilitated electron transport for the tantalum nitride based materials to the conductive substrate.

Key words: tantalum nitride; nanotubular membranes; titanium nitride; water splitting

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