

材料科学

NiO-TiO₂纳米管阵列异质结电极的制备及光电化学性能

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摘要:

采用阳极氧化方法在金属钛表面制备TiO₂纳米管阵列, 管内径为60~90 nm, 壁厚约为15 nm, 长度为600 nm, 通过化学镀Ni并结合空气中热处理过程, 在TiO₂表面生长出NiO纳米颗粒层, 厚度约为200 nm, 颗粒尺寸为20~40 nm, 获得异质结型NiO-TiO₂纳米管阵列复合电极. 结果表明, 在100 mW/cm²的辐照下, 该光阳极可提高其光电化学特性. 在 0.65 V 偏压时的光电流密度和光电转换效率分别为3.05 mA/cm²和1.41%.

关键词: TiO₂纳米管阵列 NiO-TiO₂异质结电极 紫外-可见光吸收 光电化学性质

Preparation and Photoelectrochemical Property of |NiO/TiO₂ Nanotube Arrays Heterojunction Electrode

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Abstract:

TiO₂ nanotube arrays were prepared by means of anodizing method on the surface of titanium films. The packed n\|type TiO₂ tubes have an inner pore diameter of 60—90 nm, a wall thickness of approximately 15 nm and a length of 600 nm. The NiO/TiO₂ heterojunction electrode was synthesized by means of electroless plating and annealing which resulted in TiO₂ nanotube arrays coated with a layer (about 200 nm in thickness) of NiO particles (20—40 nm). The results show that NiO/TiO₂ heterojunction electrode enhanced photoelectrochemical property under 100 mW/cm² irradiation. The photocurrent density is 3.05 mA/cm², and photoelectricity conversion efficiency is 1.41% at a bias voltage of 0.65 V.

Keywords: TiO₂ nanotube arrays NiO/TiO₂ heterojunction electrode UV-Vis absorbance photoelectrochemical property

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