

Accepted Manuscript

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PII: S0254-0584(17)31039-8

DOI: [10.1016/j.matchemphys.2017.12.083](https://doi.org/10.1016/j.matchemphys.2017.12.083)

Reference: MAC 20265

To appear in: *Materials Chemistry and Physics*

Please cite this article as: Wenqian Qi, Jun Du, Yichao Peng, Wenhua Wu, Zijian Zhang, Xiuyun Li, Kai Li, Kai Zhang, Cheng Gong, Mei Luo, HaiLong Peng, Hydrothermal synthesis of TiO₂ nanorods arrays on ITO, *Materials Chemistry and Physics* (2018), doi: 10.1016/j.matchemphys.2017.12.083

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Hydrothermal synthesis of TiO₂ nanorods arrays on ITO

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Abstract

Here we report a self-induced catalyst-free preparation of TiO₂ nanorods arrays by hydrothermal method. TiCl₄, H₂O, and HCl were used as the titanium precursor, oxygen source, and inhibitors, respectively. TiO₂ nanorods arrays were successfully formed on the ITO conductive film with high density. SEM results showed that the quadrate nanorods were approximately 2 μm long and quadrate side length was about 50-230 nm. The TiO₂ nanorods grow along perpendicular to the [101] direction of the tetragonal anatase TiO₂ crystal from the bottom with the tip being pushed upwards. The contact angel of TiO₂ nanorods after ultraviolet irradiation was under to 0°, and which exhibited excellent hydrophilic property. After 2 h photocatalytic reaction, the degradation rate of acid red and methyl orange could reach to 92.83% and 97.89%, respectively. The degradation rate of methyl orange and acid red still remained at 88% and 85% after 10 cycles, respectively. These results showed that TiO₂ nanorods have great photocatalytic capability.

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