

A facile way to fabricate TiO_2 nanostructures with variable crystalline structures and morphologies, and experiment about their properties depended on their morphologies

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Vertically aligned various TiO_2 nanostructures were synthesized using a hydrothermal reaction. The brookite structures have unique bullet-shaped structure which had a length of 700~1000 nm and a width of 150~250 nm with the sharpened tip structure. By adjusting concentration of NaOH in hydrothermal reaction, we could also synthesize other types of TiO_2 nanostructures including anatase TiO_2 nanotubes/nanowires. The morphologies and crystal structures of the products were confirmed by the SEM, TEM and XRD analysis. The photoelectrochemical properties such as photocurrent density and open circuit voltage were measured in a three-electrode electrochemical cell with TiO_2 nanoarrays, Ag/AgCl and Pt flag as the working, reference and counter electrode, respectively, incorporating a 0.1M NaOH electrolyte solution. The fabricated brookite TiO_2 nanoarrays exhibited highly enhanced photocurrent density and the longer electron life time compared with anatase TiO_2 nanoarrays with similar lengths.