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Enhancement of Photocatalytic Hydrogen Production of Ni Modified Titania/TiO2 Nanostructures by Tuning Structural and Morphological Properties

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Photocatalytic water splitting is a promising method to store and convert solar energy into storable, transportable hydrogen fuel. The interest in hydrogen energy is growing, not only because of its clean-burning qualities, but also owing to its high gravimetric energy density, possibility to deliver or store a large amount of energy, etc. The main scientific challenge associated with photocatalytic water splitting systems is development of stable nanostructured photocatalysts with well-controlled morphological and textural properties and improved photocatalytic efficiency. In the present study Ni modified titanate/TiO2 catalysts were synthesised by deposition/precipitation method of Ni ions on hydrothermally prepared titanate supports. The obtained catalysts were characterized using various methods: N2 physisorption, XRD, TEM, TPR. The comprehensive study of the photocatalytic performance toward hydrogen production of the prepared catalysts was conducted as a function of the various synthesis parameters including: used precipitation agent, applied ion-exchange reaction conditions and reduction temperature. Moreover, the investigation of the nickel content on the photocatalytic hydrogen production allowed us to define the optimal metal content in the prepared catalysts.

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