Effect of annealing conditions on photocatalytic activity of TiO_2 nanords prepared by hydrothermal method

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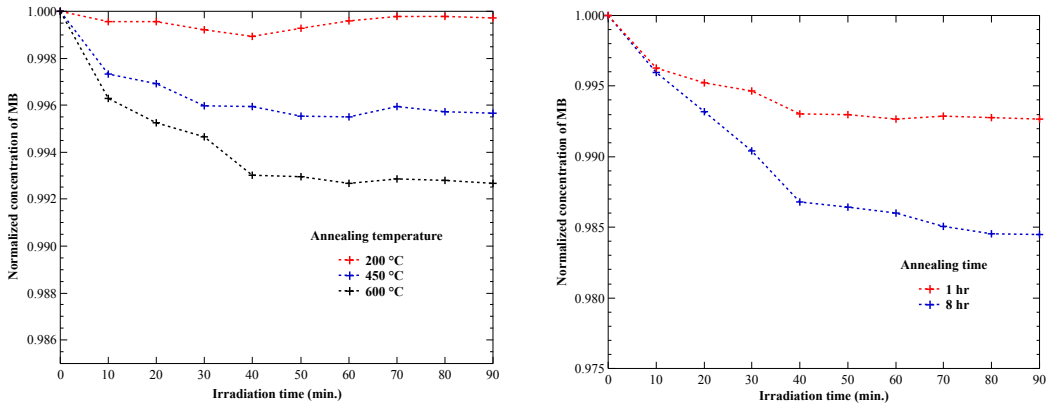
Owing to the excellent chemical and photochemical stability, TiO_2 has always been a promising material for numerous applications, such as water splitting. For better application, the morphology and crystal structure of TiO_2 need to be well controlled[1, 2]. The electron transport along the long axis of the 1D crystalline nanostructure such as nanorod is expected to be several orders of magnitude faster than that in the random network of nanoparticles as 1D nanostructure can provide direct transport pathways for charge carriers. Among several preparation methods for TiO_2 nanorods, the hydrothermal method is commonly used for synthesis as it offers low temperature synthesis, the flexibility to attain different particle sizes and morphologies. In the present work, a seed layer of TiO_2 thin film is prepared on the substrate to avoid big lattice mismatch between anatase TiO_2 and substrate and further TiO_2 nanorods were hydrothermally grown on the prepared anatase TiO_2 thin film. The goal of the present work is to understand the effect of post treatment such as annealing time, temperature as well as atmosphere on the photocatalytic activity prepared TiO_2 nanorods.



(a) **(b)**

Fig. 1 : Photocatalytic degradation of methylene blue under UV light irradiation (a) different annealing temperatures for 1hr respectively (b) different annealing time at 600 ˚C

References:

1. C.G. Kuo, C.Y. Hsu, S.S Wang, D.C. Wen, Photocatalytic characteristics of TiO_2 thin films deposited by magnetron sputtering on polycarbonate at room temperature, Appl. Surf. Sci. 258 (2012) 6952-6957.

2. X. Chen, S.S. Mao, Titanium dioxide nanomaterials: synthesis, properties, modifications, and applications, Chem. Rev. 107 (7) (2007) 2891-2959.

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