The influence of the morphology of 1D TiO 2 nanostructures on photogeneration of reactive oxygen species and enhanced photocatalytic activity

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The influence of morphology in one-dimensional (1D) TiO 2 nanostructures?specifically nanotubes (TNT), nanofibers (TNF), nanorods (TNR), and nanowires (TNW)?on the photogeneration of reactive oxygen species (ROS) and the resulting effect on photocatalytic activity were investigated. 1D TiO 2 nanostructures were obtained by hydrothermal route, by employing changes in the crystalline phase of TiO 2 precursor and reaction temperature as the morphology-controlling factors. Morphological, structural, textural, and optical properties were studied using scanning and transmission electron microscopy, X-ray diffraction, BET surface area analysis, diffuse reflectance and photoluminescence spectroscopy. The photochemical behaviour of these 1D TiO 2 nanostructures was evaluated through ROS quantification including 1 O 2 and [rad]OH, and it was found that TNF exhibits the highest amount of generated ROS, the following tendency was observed: TNF > TNT > TNR > TNW. In addition, t