Public Abstract
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Title:NOVEL METHODS FOR PREPARATION OF MODIFIED 1-DIMENSIONAL NANOMATERIALS OF TITANIUM DIOXIDE FOR ENVIRONMENTAL ENGINEERING APPLICATIONS

Titanium dioxide nanomaterials are widely used as a photocatalyst. However original titanium dioxide nanomaterials only activate with ultra-violet light. Doping titanium dioxide with nitrogen will enable the material to be activated with visible light and increase photocatalytic efficiency. In this research, novel methods of preparation of nitrogen-doped 1-dimensional titanium dioxide nanomaterials have been developed. In the first method, non-thermal plasma treatment in nitrogen atmosphere was successfully applied to prepare nitrogen-doped titanium dioxide nanotubes. The second method is developed based on electrospinning technique, with which nitrogen-doped titanium dioxide nanofibers with polyacrylonitrile as the polymer template was successfully prepared. Both as-prepared titanium dioxide nanomaterials exhibited photocatalytic activation under visible light through the investigation of methylene blue removal in aqueous phase. Further experiments showed that the as-prepared titanium dioxide nanomaterials prepared were also capable of oxidizing benzene, toluene, ethylbenzene and xylene in water under visible light. The observed removal efficiencies of benzene, toluene, ethylbenzene and xylene by the as prepared titanium dioxide nanomaterials were comparable with other practical techniques currently in use such as flotation or adsorption. The prepared 1-dimensional titanium dioxide nanomaterials are therefore considered to offer a wide range of sustainable engineering applications for degradation of contaminants in water.