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**Title:** One-Step Decoration of TiO<sub>2</sub> Nanotubes with Fe<sub>3</sub>O<sub>4</sub> Nanoparticles: Synthesis and Photocatalytic and Magnetic Properties

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**Abstract:** This paper presents an effective hydrothermal route to decorate various types of anodic 1D TiO<sub>2</sub> nanotubes (TiO<sub>2</sub> NTs) with magnetite nanoparticles (Fe<sub>3</sub>O<sub>4</sub> NPs), yielding a magnetically guidable and active photocatalyst. A unique portfolio of TiO<sub>2</sub> NTs including single-tube, single-walled, and double-walled ones was used. Optimal conditions for uniform decoration of these nanotubes by Fe<sub>3</sub>O<sub>4</sub> NPs (two different loadings) using a wet chemical synthesis based on an oleate hydrothermal approach were found. The resulting TiO<sub>2</sub>NTs@Fe(3)O(4)NPs were shown to be superparamagnetic at room temperature, to have a stable connection of NPs to NTs, and to have good magnetic response under an external applied magnetic field. The as-prepared materials were used as magnetically guidable photocatalyst for the decomposition of a model dye (methylene blue). Fe<sub>3</sub>O<sub>4</sub> NPs enhanced the photocatalytic activity of TiO<sub>2</sub> NTs under visible light. In principle, TiO<sub>2</sub>NTs@Fe(3)O(4)NPs could be used as magnetically guidable drug delivery system with photoinduced drug release.

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