Phase transformation and crystallite growth of Fe-doped TiO2 nanofibers by electrospinning technique

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Fe-doped TiO2 nanofibers were fabricated by an electrospinning technique using poly (vinylpyrrolidine) and titanium isopropoxide as precursors. When the calcination temperature was increased, the crystallite size of the TiO2 nanofibers increased. The Fe-doped TiO2 nanofiber crystallites were larger than those of pure TiO2 nanofibers because Fe promotes phase transformation. Fe controlled the phase transformation and also affected the growth of anatase crystallites. The photocatalysts were evaluated using the photodecomposition of methylene blue under UV light. Fe-doped TiO2 nanofibers were found to be more efficient than pure TiO2 nanofibers for photocatalytic degradation of methylene blue. The photocatalytic degradation rate fitted a pseudo-first-order equation. The rate constants of pure TiO2 nanofibers and 0.5%-Fe-doped TiO2 nanofibers were 0.276 and 0.570, respectively.