DEVELOPMENT OF NONMETAL-DOPED TiO₂ NANOTUBE PHOTOCATALYST FOR DECOLORIZATION OF METHYL ORANGE

by

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- Figure 4.30 Effect of C-TiO₂ NT length on the photocatalytic 110 decolorization of MO solution under visbile light irradiation (Co = 30 ppm)
- Figure 4.31 Effect of C-TiO₂ NT wall thickness on the photocatalytic 111 decolorization of MO solution under visible light irradiation (Co = 30 ppm)

- Figure 4.32 Dependence of rate constant (k) of C-TiO₂ NT on the 113 annealing temperature
- Figure 4.33 Dependence of rate constant (k) of TiO₂ NT on the annealing 114 atmosphere.
- Figure 4.34 FESEM images of CP-TiO₂ NT formed in different volume 116 fraction of EG:H₃PO₄, (a) P1, (b) P2, (c) P3, (d) P4 and (d) P5. The insets show the cross- section view of respective morphologies.
- Figure 4.35 Current density versus time plot of Ti anodized at various 119 electrolyte composition, (a) P1, (b) P2, (c) P3, (d) P4 and (e) P5.
- Figure 4.36 XRD patterns of CP-TiO₂ NT formed in formed in different 121 volume fraction of EG:H₃PO₄ and subsequent annealing in argon atmosphere at 400 °C for 4 hr, (a) P2, (b) P3, (c) P4 and (d) P5.
- Figure 4.37 FESEM images of CP-TiO₂ NT formed in 90:10 122 (EG:H₃PO₄) electrolyte containing 0.66 wt% NH₄F for 60 min at (a) 30, (b), 40, (c) 50 and (d) 60 V. The inset shows the cross-section view of respective morphologies. (FESEM images taken after annealing at 400 °C for 4 hr in argon atmosphere)
- Figure 4.38 XRD patterns of CP-TiO₂ NT prepared in 90:10 (EG:H₃PO₄) 123 electrolyte containing 0.66 wt% NH₄F at (a) 30 V, (b) 40 V,
 (c) 50 and (d) 60 V for 60 min after annealed in argon atmosphere for 4 hr at 400 °C.

- Figure 4.39 FESEM images of CP-TiO₂ NT formed in 90:10 (EG: 124 H_3PO_4) electrolyte containing 0.66 wt% NH₄F for 1 hr at 60 V and subsequent annealed at 400 °C for 4 hr in N₂. The inset shows the cross-section view of respective morphologies.
- Figure 4.40 PL spectra and their Gaussian fit band of CP-TiO₂ NT 125 formed in 90:10 (EG: H_3PO_4) electrolyte containing 0.66 wt% NH₄F for 1 hr at 60 V and subsequent annealed at 400 °C for 1 hr in (a) Ar and (b) N₂ atmosphere (excitation wavelength = 325 nm).
- Figure 4.41 Visible light decolorization of MO solution using CP-TiO₂ 126 NT prepared in 90:10 (EG:H₃PO₄) electrolyte and pure EG containing 0.66 wt% NH₄F
- Figure 4.42 FESEM images of CP-TiO₂ NT formed by anodization of 127
 0.1 mm thick Ti foil in EG solution containing 0.66 wt%
 NH₄F, 1.0wt% H₂O at 60 V, wet impregnation in (a) 0.01 M,
 (b) 0.02 M, (c) 0.03 M, (d) 0.04 M and (e) 0.05 M H₃PO₄ for
 60 min at 40 °C and subsequent annealed at 500 °C for 4 hr
 in Ar atmosphere. The insets show the cross-section view of
 respective morphologies.
- Figure 4.42 FESEM images of TiO₂ CP-NT formed by anodization of 129
 0.1 mm thick Ti foil in EG solution containing 0.66 wt%
 NH₄F, 1.0wt% H₂O at 60 V, wet impregnation in (e) 0.05 M
 H₃PO₄ for 60 min at 40 °C and subsequent annealed at 500
 °C for 4 hr in Ar atmosphere. The insets show the cross-section view of respective morphologies. (continued)