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

by

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Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

October 2015

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious, and the Most Merciful

Alhamdulillah, all praises to the one who created the whole universe, Allah SWT for the strength and His blessing in completing this thesis. This experience as PhD student would never be possible without long list of people and this is the testament for them.

I am deeply thankful to USM for giving me opportunity of being a postgraduate student in SMMRE. My sincere thanks to Dean, Deputy Dean, lecturers, technicians, staff and others whose contributed in my study. Thanks also to the USM Fellowship for financial support and USM RU-PRGS for providing my doctoral grant, which enabled me to carry out the research presented in this thesis.

I would like to offer my most sincere gratitude to my supervisor, Associate Professor Ir. Dr. Srimala Sreekantan, who has played a decisive role in encouraging me to start this PhD. I thanked her for her extensive help and guidance over the course of my PhD studies. Her leadership, time and energy and provisions of countless opportunities, ensured that my research was at its best.

My special thanks to current and previous graduate students, Zuliana, Emee, Dr. Farah, Dr. Aida, Dr. Syahriza, Dr. Steven Lai, Yanny and Atiqah for making my PhD a very enjoyable experience. Thank you for all the friendship and fun we have shared.

I would like to thank my wonderful parents, Hj. Saharudin Mohamad and Hjh. Hamishah Hj. Samsury, my brothers, my sister and their families for unconditional love and support for me to complete this work. Last but not least, to everybody who has directly and indirectly involve in accomplishment of my study successfully, you cooperation is highly appreciate.

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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)