

บรรณานุกรม

กรุงเทพธุรกิจ. 2550. หุ้น-การเงิน: ไทยอยล์เพย์ไตรมาส 1 กำไรสูงกว่า 5.7 พันล้านบาท. กรุงเทพธุรกิจ. วันจันทร์ที่ 14 พฤษภาคม 2550.

กรมควบคุมมลพิษ. 2541. โทลูอีน (Toluene). กองจัดการสารอันตรายและการของเสีย. กรมควบคุมมลพิษ. กรุงเทพฯ.

คณะกรรมการสิ่งแวดล้อมแห่งชาติ. 2543. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติดบบที่ 20 (พ.ศ. 2543) เรื่อง กำหนดมาตรฐานคุณภาพน้ำไดคิน. คณะกรรมการสิ่งแวดล้อมแห่งชาติ. กระทรวงทรัพยากรและสิ่งแวดล้อม. กรุงเทพฯ

จตุพร วิทยาคุณ และ นุรักษ์ กฤษданนุรักษ์. 2547. การเร่งปฏิกิริยา พื้นฐานและการประยุกต์. โรงพิมพ์มหาวิทยาลัยธรรมศาสตร์. กรุงเทพฯ.

วิทยา เรืองพรวิสุทธิ์. 2547. ปฏิกิริยาเร่ง เคมีเกี่ยวกับพิวและปีโตรเคมี. สมาคมส่งเสริมเทคโนโลยี (ไทย-ญี่ปุ่น). กรุงเทพฯ.

ศิริชัย กิบาลจอมมี และ ขจรศักดิ์ โสภางารีย์. 2544. การกำจัดสีของน้ำเสียด้วยกระบวนการไฟโตแคตาไลติกโดยใช้ตัวเร่งปฏิกิริยาไทยเนียม โคออกไซด์. ว. วิศวกรรมศาสตร์ มหาวิทยาลัยเชียงใหม่, 9: 10-18.

สุรพงษ์ สุวัจตานันท์. 2541. คตាឩิตส์: เกิดกี่ทีต้องมีเชอ. ว. เทคโนโลยี. ปีที่ 18. ฉบับที่ 2. สำนักส่งเสริมและถ่ายทอดเทคโนโลยี.

เสรี ตุ่นประกาย และ ลิริวัลก์ เรืองช่วย. 2547. ตัวเร่งปฏิกิริยาเพื่อลดสารในน้ำเสียด้วยพลังงานแสงอาทิตย์. ว. เทคนิค เครื่องกลไฟฟ้า อุตสาหการ, 238: 129-134.

อดิศร จตุรพิริย์ และ ขจรศักดิ์ โสภางารีย์. 2544. การสลายตัวด้วยไฟโตแคตาไลติกของสารประกอบคลอร์ฟีนอลโดยใช้ถังปฏิกิริยาแบบเทที่มีการหมุนเวียน. ว. วิศวกรรมศาสตร์ มหาวิทยาลัยเชียงใหม่, 9: 19-27.

อรพรรณ เมฆาเดลิกุล. 2550. โรคพิษโทลูอีน. สำนักงานอาชีววิชาศาสตร์และสิ่งแวดล้อม. กรุงเทพฯ
Alberici, R.M. and Jardim, W.F. 1997. Photocatalytic destruction of VOCs in the gas-phase using titanium dioxide. Applied Catalysis B: Environmental, 14: 55-68.

Alfano, O.M., Bahnemann, D., Cassano, A.E., Dillert, R. and Goslich, R. 2000. Photocatalysis in water environments using artificial and solar light. Catalysis Today, 58: 199-230.

- Areña, J., Nieto, J.L.M., Melián, J.A.H., Rodríguez, J.M.D., Díaz, O.G., Peña, J.P., Bergasa, O., Alvarez, C. and Méndez, J. 2004. Photocatalytic degradation of formaldehyde containing wastewater from veterinarian laboratories. *Chemosphere*, 55: 893-904.
- Augugliaro, V., Coluccia, S., Loddo, V., Marchese, L., Martra, G., Palmisano, L. and Schiavello, M. 1999. Photocatalytic oxidation of gaseous toluene on anatase TiO₂ catalyst: mechanistic aspects and FT-IR investigation. *Applied Catalysis B: Environmental*, 20: 15-27.
- Bickley, R.I., Gonzalez-Carreno, T., Lee, J.S., Palmisano, P.L. and Tilley, J.D. 1991. A structural investigation of titanium dioxide photocatalysts. *Solid State Chemistry*, 92: 178-190.
- Blount, M. C. and Falconer, J. L. 2002. Steady-state surface species during toluene photocatalysis. *Applied Catalysis B: Environmental*, 39: 39-53.
- Bosc, F., Edwards, D., Keller, N., Keller, V. and Ayral, A. 2006. Mesoporous TiO₂-based photocatalysts for UV and visible light gas-phase toluene degradation. *Thin Solid Films*, 495: 272-279.
- Bratek, W., Bratek, K. and Kułażyński, M. 2002. The utilization of waste ion exchange resin in environmental protection. *Fuel Processing Technology*, 77-78: 431–436.
- Cao, L., Gao, Z., Suib, S.Y., Obiee, T.N., †Hay, S.O. and †Freihaut, J.D. 2000. Photocatalytic oxidation of toluene on nanoscale TiO₂ catalysts: studies of deactivation and regeneration. *Catalysis*, 196: 253-261.
- Chan, C.C., Chang, C.C., Hsu, W.C., Wang, S.K. and Lin, J. 2009. Photocatalytic activities of Pd-loaded mesoporous TiO₂ thin films. *Chemical Engineering Journal*, 152: 492-497.
- Chen, C., Wang, Z., Ruan, S., Zou, B., Zhao, M. and Wu, F. 2008. Photocatalytic degradation of C.I. Acid Orange 52 in the presence of Zn-doped TiO₂ prepared by a stearic acid gel method. *Dyes and Pigments*, 77: 204-209.
- Chen, Y. and Dionysiou, D.D. 2006. Correlation of structural properties and film thickness to photocatalytic activity of thick TiO₂ films coated on stainless steel. *Applied Catalysis B: Environmental*, 69: 24-33.
- Chen, Y. and Dionysiou, D.D. 2006. TiO₂ photocatalytic films on stainless steel: The role of Degussa P-25 in modified sol-gel methods. *Applied Catalysis B: Environmental*, 62: 255-264.

- Chmielewski, A.G., Ostapczuk, A., Zimek, Z., Licki, J. and Kubica, K. 2002. Reduction of VOCs in fuel gas from coal combustion by electron beam treatment. *Radiation Physics and Chemistry*, 63: 653-655.
- Cho, Y., Kyung, H. and Choi, W. 2004. Visible light activity of TiO₂ for the photoreduction of CCl₄ and Cr(VI) in the presence of nonionic surfactant (Brij). *Applied Catalysis B: Environmental*, 52: 23-32.
- Choi, J.W., Yang, K.S., Kim, D.J. and Lee, C.E. 2009. Adsorption of zinc and toluene by alginate complex impregnated with zeolite and activated carbon. *Current Applied Physics*, 9: 694-697.
- Chung, C.J., Lin, H.I. and He, J.L. 2007. Antimicrobial efficacy of photocatalytic TiO₂ coatings prepared by arc ion plating. *Surface & Coating Technology*, 202: 1302-1307.
- Colmenares, J.C., Aramendia, M.A., Marinas, A., Marinas, J.M. and Urbano, F.J. 2006. Synthesis, characterization and photocatalytic activity of different metal-doped titania systems. *Applied Catalysis A: General*, 306: 120-127.
- Cox, H. H. J. and Deshusses, M. A. 2002. Co-treatment of H₂S and toluene in a biotrickling filter. *Chemical Engineering Journal*, 87: 101–110.
- Criado, S., Bertolotti, S.G., Soltermann, A.T. and García, N.A. 1997. Kinetic studies of the photosensitized oxidation (O₂(¹Δ_g)-mediated) of tryptophan-alkyl esters in Triton X-100 micellar solutions. *Photochemistry and Photobiology B: Biology*, 38: 107-113.
- Duarte, C. L., Geraldo, L. L., Junior, O. A. P., Borrely, S. I., Sato, I. M. and Sampa, M. S. O. 2004. Treatment of effluents from petroleum production by electron beam irradiation. *Radiation Physics and Chemistry*, 71: 443–447.
- Einaga, H., Futamura, S. and Ibusugi, T. 2002. Heterogeneous photocatalytic oxidation of benzene, toluene, cyclohexene and cyclohexane in humidified air: comparison of decomposition behavior on photoirradiated TiO₂ catalyst. *Applied Catalysis B: Environmental*, 38: 215-225.
- Evans, P., English, T., Mammond, D., Pemble, M.E. and Sheel, D.W. 2007. The role of SiO₂ barrier layers in determining the structure and photocatalytic activity of TiO₂ films deposited on stainless steel. *Applied Catalysis A: General*, 321: 140-146.
- Evans, P. and Sheel, D.W. 2007. Photoactive and antibacterial TiO₂ thin films on stainless steel. *Surface & Coating Technology*, 201: 9319-9324.

- Fabbri, D., Prevot, A.B. and Pramauro, E. 2004. Kinetic effects of SDS on the photocatalytic degradation of 2,4,5-trichlorophenol. *Applied Catalysis B: Environmental*, 49: 233-238.
- Fabbri, D., Prevot, A.B. and Pramauro, E. 2006. Effect of surfactant microstructures on photocatalytic degradation of phenol and chlorophenols. *Applied Catalysis B: Environmental*, 62: 21-27.
- Fuerte, A., Hernández-Alonso, M. D., Marira, A. J., Martínez-Arias, A. and Fernández-García, M. 2002. Nanosize Ti-W mixed oxides: Effect of doping level in the photocatalytic degradation of toluene using sunlight-type excitation. *Catalysis*, 212: 1-9.
- Galvez, J.B. 2003. Solar detoxification. United Nations Educational, Scientific and Cultural Organization. Spain.
- García, M.F., Fuerte, A., Hernández-Alonso, M. D., Soria, J. and Arias, M. 2006. Platinization of sunlight active Ti-W mixed oxide photocatalysts. *Catalysis*, 245: 84-90.
- Ghasemi, S., Rahimnejad, S., Setayesh, S.R., Rohani, S. and Gholami, M.R. 2009. Transition metal ions effect on the properties and photocatalytic activity of nanocrystalline TiO₂ prepared in an ionic liquid. *Hazardous Materials*, 172: 1573-1578.
- Giornelli, T., Löfberg, A. and Richard, E.B. 2006. Preparation and characterization of VO_x/TiO₂ catalytic coating on stainless steel plates for structure catalytic reactor. *Applied Catalysis A: General*, 305: 107-203.
- Giornelli, T., Löfberg, A., Guillou, L., Paul, S., Courtois, V.L. and Richard, E.B. 2007. Catalytic wall reactor catalytic coatings of stainless steel by VO_x/TiO₂ and Co/SiO₂ catalyst. *Catalysis Today*, 128: 201-207.
- Hamdi, B., Houari, M., Hamoudi, S. A. and Kessáissia, Z. 2004. Adsorption of some volatile organic compounds on geomaterials. *Desalination*, 166: 449-455.
- Hamed, T. A., Bayraktar, E., Mehmetoglu, U. and Mehmetoglu, T. 2004. The biodegradation of benzene, toluene and phenol in a two-phase system. *Biochemical Engineering Journal*, 19: 137-146.
- Hayon, E. and Rao, P.S. 1975. One-electron oxidation of odd-valent metal ions in solution. *Physical Chemistry*, 79: 865-868.
- He, H., Yang, S., Yu, K., Ju, Y., Sun, C. and Wang, L. 2010. Microwave induced catalytic degradation of crystal violet in nano-nickel dioxide suspensions. *Hazardous Materials*, 173: 393-400.

- Hennezel, O., Pichat, P. and Ollis, D.F. 1998. Benzene and toluene gas-phase photocatalytic degradation over H₂O and HCL pretreated TiO₂: by-products and mechanisms. *Photochemistry and Photobiology A: Chemistry*, 118: 197-204.
- Hoffmann, M.R, Martin, S.T., Choi, W. and Bahnemann, D.W. 1995. Environmental application of semiconductor photocatalysis. *Chem. Rev.* 95, No. 1: 69-96.
- Holmberg, K., Jönsson, B., Kronberg, B. and Lindman, B. 2003. Surfactants and polymers in aqueous solution. 2nd ed. John Wiley & Sons Ltd. England.
- Horikoshi, S., Abe, M. and Serpone, N. 2009. Influence of alcoholic and carbonyl functions in microwave-assisted and photo-assisted oxidative mineralization. *Applied Catalysis B: Environmental*, 89: 284-287.
- Hsiang, H.I and Lin, S.C. 2004. Effect of aging on the phase transformation and sintering properties of TiO₂ gels. *Materials Science and Engineering A*, 380: 67-72.
- Hsiang, H.I and Lin, S.C. 2008. Effect of aging on nanocrystalline anatase-to-rutile phase transformation kinetics. *Ceramics International*, 34: 557-561.
- Ilyin, V. K., Smirnov, I. A., Soldatov, P. E., Korniushenkova, I. N., Grinin, A. S., Lykov, I. N. and Safronova, S. A. 2004. Microbial utilization of natural organic wastes. *Acta Astronautica*, 54: 357-361.
- Jajarmi, P. 2009. Fabrication of pure ZnO nanoparticles by polymerization method. *Materials Letters*, 63: 2646-2648.
- Jeong, J., Sekiguchi, K. and Sakamoto, K. 2004. Photochemical and photocatalytic degradation of gaseous toluene using short-wavelength UV irradiation with TiO₂ catalyst: comparison of three UV sources. *Chemosphere*, 57: 663-671.
- Jiang, Y., Sun, Y., Liu, H., Zhu, F. and Yin, H. 2008. Solar photocatalytic decolorization of C.I. Basic Blue 41 in an aqueous suspension of TiO₂-ZnO. *Dyes and Pigments*, 78: 77-83.
- Ji, H., Wang, H., Zhang, M., She, Y. and Wang, L. 2005. Sample fabrication of nano-sized NiO₂ powder and its application to oxidation reactions. *Applied Catalysis A: General*, 282: 25-30.
- Jing, D., Zhang, Y. and Guo, L. 2005. Study on the synthesis of Ni doped mesoporous TiO₂ and its photocatalytic activity for hydrogen evolution in aqueous methanol solution. *Chemical Physics Letters*, 415: 74-78.

- Jung, C.K., Bae, I.S., Song, Y.K., Kim, T.K., Vlcek, J., Musil, J. and Boo, J.H. 2005. Synthesis of TiO₂ photocatalyst and study on their improvement technology of photocatalytic activity. *Surface & Coatings Technology*, 200: 534-538.
- Jung, Y.S., Yoo, B., Lim, M.K., Lee, S.Y. and Kim, K.J. 2009. Effect of Triton X-100 in water-added electrolytes on the performance of dye-sensitized solar cells. *Electrochimica Acta*, 54: 6286-6291.
- Keller, N., Barraud, E., Bosc, F., Edwards, D. and Keller, V. 2006. On the modification of photocatalysts for improving visible light and UV degradation of gas-phase toluene over TiO₂. *Applied Catalysis B: Environmental*, 70: 423-430.
- Kim, D.H., Choi, D.K., Kim, S.J and Lee, K.S. 2008. The effect of phase type on photocatalytic activity in transition metal doped TiO₂ nanoparticles. *Catalysis Communication*, 9: 654-657.
- Kórösi, L., Papp, S., Ménesi, J., Illés, E., Zöllmer, V., Richardt, A. and Dékány, I. 2008. Photocatalytic activity of silver-modified titanium dioxide at solid-liquid and solid-gas interfaces. *Colloids and Surfaces A: Physicochem*, 319: 136-142.
- Kozlova, E.A. and Vorontsov, A.V. 2007. Influence of mesoporous and platinum-modified titanium dioxide preparation methods on photocatalytic activity in liquid and gas phase. *Applied Catalysis B: Environmental*, 77: 35-45.
- Kubacka, A., García, M.F. and Colón, G. 2008. Nanostructured Ti-M mixed-metal oxides: Toward a visible light-driven photocatalyst. *Catalysis*, 254: 272-284.
- Kubacka, A., Colón, G. and García, M.F. 2009. Cationic (V, Mo, Nb, W) doping of TiO₂-anatase: A real alternative for visible light-driven photocatalysts. *Catalysis Today*, 143: 286-292.
- Kurucz, C. N., Waite, T. D. and Cooper, W. J. 1994. Empirical models for estimating the destruction of toxic organic compounds utilizing electron beam irradiation at full scale. *Radioactive Physics Chemistry*, 45: 805-816.
- Kurucz, C. N., Waite, T. D., Otano, S. E., Cooper, W. J. and Nickelsen, M. G. 2002. A comparison of large-scale electron beam and bench-scale ⁶⁰Co irradiations of simulated aqueous waste streams. *Radiation Physics and Chemistry*, 65: 367-378.
- Kwon, S.H. and Cho, D. 2009. A comparative, kinetic study on cork and activated carbon biofilters. *Industrial and Engineering Chemistry*, 15: 129-135.

- Lee, E.H. and Cho, K.S. 2009. Effect of substrate interaction on the degradation of methyl *tert*-butyl ether, benzene, toluene, ethylbenzene, and xylene by *Rhodococcus* sp. Hazardous Materials, 167: 669-674.
- Li, B., Wang, X., Yan, M. and Li, L. 2002. Preparation and characterization of nano-TiO₂ powder. Materials Chemistry and Physics, 78: 184-188.
- Lu, C., Su, F. and Hu, S. 2008. Surface modification of carbon nanotubes for enhancing BTEX absorption from aqueous solution. Applied Surface Science, 254: 7035-7041.
- Luo, Y. and Ollis, D.F. 1996. Heterogeneous photocatalytic oxidation of trichloroethylene and toluene mixture in air: kinetic promotion and inhibition, time-dependent catalyst activity. Catalysis, 163: 1-11.
- Maira, A.J., Yeung, K.L., Soria, J., Coronado, J.M., Belver, C., Lee, C.Y. and Augugliaro, V. 2001. Gas-phase photo-oxidation of toluene using nanometer-size TiO₂ catalysts. Applied Catalysis B: Environmental, 29: 327-336.
- Marcí, G., Addamo, M., Augugliaro, V., Coluccia, S., García, L.E., Loddo, V., Martra, G., Palmisano, L. and Schiavello, M. 2003. Photocatalytic oxidation of toluene on irradiated TiO₂: Comparison of degradation performance in humidified air, in water and in water containing a Zwitterionic surfactant. Photochemistry and Photobiology A, 160: 105-114.
- Marugán, J., Grieken, R.V., Cassano, A.E. and Alfan, O.M. 2009. Scaling-up of slurry reactors for the photocatalytic oxidation of cyanide with TiO₂ and silica-supported TiO₂ suspensions. Catalysis Today, 144: 87-93.
- Material Safety Data Sheet [MSDS]. (2006). Safety data of toluene. UK: Safety Officer in Physical Chemistry at Oxford University. Available from: www.pcl.ox.ac.uk/MSDS/TO/toluene. Accessed date: Oct 21, 2007.
- Material Safety Data Sheet [MSDS]. (2007). Safety data of sodium dodecyl sulfate. UK: Safety Officer in Physical Chemistry at Oxford University. Available from: http://msds.chem.ox.ac.uk/SO/sodium_dodecyl_sulfate.html. Accessed date: Jan 25, 2010.
- Material Safety Data Sheet [MSDS]. (2009). Safety data of Triton X-100. UK: Safety Officer in Physical Chemistry at Oxford University. Available from: http://msds.chem.ox.ac.uk/TR/triton_X-100.html. Accessed date: Jan 25, 2010.
- Minero, C., Maurino, V. and Pelizzetti, E. 1997. Photocatalytic transformations of hydrocarbons at the sea water/air interface under solar radiation. Marine chemistry, 58: 361-372.

- (a) Mo, J., Zhang, Y., Xu, Q., Zhu, Y., Lamsno, J.J. and Zhao, R. 2009a. Determination and risk assessment of by-products resulting from photocatalytic oxidation of toluene. *Applied Catalysis B: Environmental*, 89: 570-576.
- (b) Mo, J., Zhang, Y., Xu, Q. and Yang, R. 2009b. Effect of TiO₂/adsorbent hybrid photocatalysts for toluene decomposition in gas phase. *Hazardous Materials*, 168: 276-281.
- Mohan, N., Kannan, G.K., Upendra, S., Subha, R. and Kumar, N.S. 2009. Breakthrough of toluene vapours in granular activated carbon filled packed bed reactor. *Hazardous Materials*, 168: 777-781.
- Nam,W., Woo, K. and Han, G. 2009. Photooxidation of anionic surfactant (sodium lauryl sulfate) in a three-phase fluidized bed reactor using TiO₂/SiO₂ photocatalyst. *Industrial and Engineering Chemistry*, 15: 348-353.
- Navio, J.A., Gómez, M.G., Adrian, M.A.P. and Mota, J.F. 1996. Partial or complete heterogeneous photocatalytic oxidation of neat toluene and 4-picoline in liquid organic oxygenated dispersions containing pure or iron-doped titania photocatalysts. *Molecular Catalysis A: Chemical*, 104: 329-339.
- Negishi, N., He, F., Matsuzawa, S., Takeuchi, K. and Ohno, K. 2006. Wave-guide type photoreactor for water purification. *Czech Republic Chemie*, 9: 822-828.
- Ogden, A., Corno, A.J., Hong, J.I., Fedorow, A. and Gole, J.L. 2008. Maintaining particle size in the transformation of anatase to rutile titania nanostructures. *Physics and Chemistry of Solids*, 69: 2898-2906.
- Oppenländer, T. 2003. Photochemical purification of water and air; Advanced oxidation processes (AOPs): Principles, reaction mechanisms, reactor concepts. WILEY-VCH, Germany.
- Paola, A.D., López, E.G., Ikeda, S., Marcí, G., Ohtani, B. and Palmisano, L. 2002. Photocatalytic degradation of organic compounds in aqueous system by transition metal doped polycrystalline TiO₂. *Catalysis Today*, 75: 87-93.
- Paola, A. D., López, E.G., Marcí, G., Martín, C., Palmisano, L., Rives, V. and Venezia, A.M. 2004. Surface characterization of metal ions loaded TiO₂ photocatalysts: structure-activity relationship. *Applied Catalysis B: Environmental*, 48: 223-233.
- Paola, A.D., Marcí, G., Palmisano, L., Schiavello, M., Uosaki, K., Ikeda, S. and Ohtani, B. 2002. Preparation of polycrystalline TiO₂ photocatalysts impregnated with various transition metal

- ions: Characterization and photocatalytic activity for the degradation of 4-nitrophenol. *Physical Chemistry. B*, 106: 637-645.
- Pernyeszi, T. and Dékány, I. 2004. Photocatalytic degradation of hydrocarbons by bentonite and TiO_2 in aqueous suspensions containing surfactants. *Colloids and Surfaces A: Physicochem*, 230: 191-199.
- Pirkanniemi, K. and Sillanpaa, M. 2002. Heterogeneous water phase catalysis as an environmental application: a review. *Chemosphere*, 48: 1047-1060.
- Porter, M.R. 1994. Handbook of surfactants. 2nd ed. Chapman & Hall, UK.
- Pramauro, E., Prevot, A.B., Vincenti, M. and Gamberini, R. 1998. Photocatalytic degradation of naphthalene in aqueous TiO_2 dispersions: effect of nonionic surfactant. *Chemosphere*, 36: 1523-1542.
- Prevot, A.B. and Pramauro, E. 1999. Analytical monitoring of photocatalytic treatments, degradation of 2,3,6-trichlorobenzoic acid in aqueous TiO_2 dispersions. *Talanta*, 48: 847-857.
- Prevot, A.B., Pramauro, E. and Guardia, M. 1999. Photocatalytic degradation of carbaryl in aqueous TiO_2 suspensions containing surfactants. *Chemosphere*, 39: 493-502.
- Reddy, K.M., Reddy, C.V.G. and Manorama, S.V. 2001. Preparation, characterization, and spectral studies on nanocrystalline anatase TiO_2 . *Solid Chemistry*, 158: 180-186.
- Ray, A.K. 1998. A new photocatalytic reactor for destruction of toxic water pollutants by advanced oxidation process. *Catalysis today*, 44: 357-368.
- Roche. 2005. Triton X-100. Roche Diagnostics GmbH. Roche Applied Science. Version Sept, 2005. Germany.
- Ryabchuk, V. 2004. Photophysical process related to photoadsorption and photocatalysis on wide band gap solids: a review. *Photoenergy*, 6: 95-113.
- Saien, J. and Nejati, H. 2007. Enhanced photocatalytic degradation of pollutants in petroleum refinery wastewater under mild condition. *Hazardous*, 148: 491-495.
- Sano, T., Negishi, N., Takeuchi, K. and Matsuzawa, S. 2004. Degradation of toluene and acetaldehyde with Pt-loaded TiO_2 catalyst and parabolic trough concentrator. *Solar Energy*, 77: 543-552.
- Sayilkcan, H. 2007. Improved photocatalytic activity of Sn^{4+} -doped and unloaded TiO_2 thin film coated stainless steel under UV- and VIS-irradiation. *Applied Catalytic A: General*, 319: 230-236.

- Shukla, S.K., Tiwari, A., Parashar, G.K., Mishra, A.P. and Dubey, G.C. 2009. Exploring fiber optic approach to sense humid environment over nano-crystalline zinc oxide film. *Talanta*, 80: 565–571.
- Sigma. 2007. Triton X-100™. Sigma Product Information Sheet. Sigma-Aldrich Co.
- Simonic, M. and Ozim, V. 1998. Thermal water treatment with granular activated carbon. *Hazardous Materials*, 60: 205–210.
- Smyth, J. (2009). Mineral Structure and Property Data TiO_2 Group. University of Colorado. Available from: <http://ruby.colorado.edu/~smyth/min/tio2.html>. Accessed date: Oct 05, 2009.
- Sun, R.D., Nakajima, A., Watanabe, I., Watanabe, T. and Hashimoto, K. 2000. TiO_2 -coated optical fiber bundles used as a photocatalytic filter for decomposition of gaseous organic compounds. *Photochemistry and Photobiology A: Chemistry*, 136: 111-116.
- Tian, G., Fu, H., Jing, L. and Tian, C. 2009. Synthesis and photocatalytic activity of stable nanocrystalline TiO_2 with high crystallinity and large surface area. *Hazardous Materials*, 161: 1122-1130.
- Toma, F.L., Berger, L.M., Jacquet, D., Wicky, D., Villaluenga, I., Miguel, Y.R. and Lindeløv, J.S. 2009. Comparative study on the photocatalytic behaviour of titanium oxide thermal sprayed coatings from powder and suspensions. *Surface & Coatings Technology*, 203: 2150-2156.
- Tseng, H.H., Wei, M.C., Hsiung, S.F. and Chiou, C.W. 2009. Degradation of xylene vapor over Ni-doping TiO_2 photocatalysts. *Chemical Engineering Journal*, 150: 160-167.
- Tsoukleris, D.S., Maggos, T., Vassilakos, C. and Falaras, P. 2007. Photocatalytic degradation of volatile organics on TiO_2 embedded glass spherules. *Catalysis Today*, 129: 96-101.
- Uhm, Y.R., Woo, S.H., Kim, W.W., Kim, S.J. and Rhee, C.K. 2006. The characterization of magnetic and photo-catalytic properties of nanocrystalline Ni-doped TiO_2 powder synthesized by mechanical alloying. *Magnetism and Magnetic Materials*, 304: e781-e783.
- Vargas, R. and Núñez, O. 2008. The photocatalytic oxidation of dibenzothiophene (DBT). *Molecular Catalysis A: Chemical*, 294: 74-81.
- Wang, D.Y., Lin, H.C. and Yen, C.C. 2006. Influence of metal plasma ion implantation on photo-sensitivity of anatase TiO_2 thin films. *Thin Solid Films*, 515: 1047-1052.
- Wei, L., Shifu, C., Wei, Z. and Sujuan, Z. 2009. Titanium dioxide mediated photocatalytic degradation of methamidophos in aqueous phase. *Hazardous Materials*, 164:154-160.

- Wen, L. (2008). Transmittance effect study for reflector acrylic. Available from: <http://www.cambot.caltech.edu>: Accessed date: Jan 25, 2010.
- Wetchakun, N. and Phanichphant, S. 2008. Effect of temperature on the degree of anatase-rutile transformation in titanium dioxide nanoparticles synthesized by the modified. *Current Applied Physics*, 8: 343-346.
- Wibowo, N., Setyadhi, L., Wibowo, D., Setiawan, J. and Ismadji, S. 2007. *Hazardous Materials*, 146: 237–242.
- Woo, S.H., Kim, W.W., Kim, S.J. and Rhee, C.K. 2007. Photocatalytic behavior of transition metal ion doped TiO_2 powder synthesized by mechanical alloying. *Materials Science and Engineering A*, 449-451: 1151-1154.
- Xie, C., Xu, Z., Yang, Q., Li, N., Zhao, D., Wang, D. and Du, Y. 2004. Comparative studies of heterogeneous photocatalytic oxidation of heptane and toluene on pure titania, titania–silica mixed oxides and sulfated titania. *Molecular Catalysis A: Chemical*, 217: 193-201.
- Xu, J.C., Lu, M., Guo, X.Y. and Li, H.L. 2004. Zinc ions surface-doped titanium dioxide nanotubes and its photocatalysis activity for degradation of methyl orange in water. *Molecular Catalysis A: Chemical*, 226: 123-127.
- Xu, J.C., Shi, Y.L., Huang, J.E., Wang, B. and Li, H.L. 2004. Doping metal ions only the catalyst surface. *Molecular Catalysis A, Chemical* 219: 351-335.
- Ying, X.J., Ying, H.H., Bo, Z.B. and Yi, Q. 2005. Effects of adding inert spheres into the filter bed on the performance of biofilters for gaseous toluene removal. *Biochemical Engineering Journal*, 23: 123–130.
- Yue, L., Hai-qiang, W. and Zhong-biao, W. 2007. Characterization of metal doped-titanium dioxide and behaviors on photocatalytic oxidation of nitrogen oxides. *Environmental Science*, 19: 1505-1509.
- Zhang, R. B. 2005. Photodegradation of toluene using silica-embedded titania. *Non-Crystalline Solids*, 351: 2129-2132.
- Zhang, W., Zhu, S., Li, Y. and Wang, F. 2008. Photocatalytic Zn-doped TiO_2 films prepared by DC reactive magnetron sputtering. *Vacuum*, 82: 328-335.
- Zhou, M., Yu, J., Liu, S., Zhai, P. and Huang, B. 2009. Spray-hydrolytic synthetic of highly photoactive mesoporous anatase nanospheres for the photocatalytic degradation of toluene in air. *Applied Catalysis B: Environmental*, 89: 160-166.

Zuo, G. M., Cheng, Z. X., Chen, H., Li, G. W. and Miao, T. 2006. Study on photocatalytic degradation of several volatile organic compounds. *Hazardous Materials B*, 128: 158-163.