

เอกสารอ้างอิง

แม้น อมรลิทธ์ และ สมชัย อัครทิวา. (2545). วัสดุวิศวกรรม. กรุงเทพมหานคร: สำนักพิมพ์ ท็อป.

After, A. R. (1954). **Dielectrics and waves**. New York: John Wiley & Sons. ค้นเมื่อ 23 กันยายน 2551, จาก http://enghome.eng.psu.ac.th/mne/staff/lek_files/ceramic/u1-7.htm

A Mastery of Sol-gel Chemistry. (2005). ค้นเมื่อ 26 ก.ค. 2553, จาก <https://www.llnl.gov/str/May05/Satcher.html>

Amino-acids. (2009). ค้นเมื่อ 23 พ.ย. 2553, จาก <http://learners.in.th/file/dawood/view/143692>

Arguello, C. A., Rousseau, D. L., Porto, S. P. S. (1969). First-Order Raman Effect in Wurtzite-Type Crystals. **Physics Review**, **181**, 1351.

Ashkarrana, A. A., Zada, A. I., Mahdavi, S. M., Ahadiana, M. M. (2009). ZnO nanoparticles prepared by electrical arc discharge method in water. **Materials Chemistry and Physics**, **118**, 6–8.

Bergman, L., Chen, X. B., Morrison, J. L., Huso, J., Purdy, A. P. (2004). Photoluminescence dynamics in ensembles of wide-band-gap nanocrystallites and powders. **Journal of Applied Physics**, **96**, 675.

Bouloudenine, M., Viart, N., Colis, S., Dinia, A. (2004). Bulk $Zn_{1-x}Co_xO$ magnetic semiconductors prepared by hydrothermal technique. **Chemical Physics Letters**, **397**, 73.

Borseth, T. M., Svensson, B. G., Kuznetsov, A. Yu., Klason, P., Zhao, Q. X., Willander, M. (2006). Identification of oxygen and zinc vacancy optical signals in ZnO. **Applied Physics Letters**, **89**, 262112.

Breedon, M., Rahmani, M. B., Keshmiri, S. H., Wlodarski, W., Zadeh, K .K. (2010). Aqueous synthesis of interconnected ZnO nanowires using spray pyrolysis deposited seed layers. **Materials Letters**, **64**, 291–294.

Brow, J. D. (1998). An Industrial Electrostatic Separation process. **TECH Talk**, **2**, 1–2.

- Caglar, M., Ilican, S., Caglar, Y. (2009). Influence of dopant concentration on the optical properties of ZnO: In films by sol-gel method. **Thin Solid Films**, 517, 5023–5028.
- Callister, Jr. W.D. (2005). วัสดุศาสตร์และวิศวกรรมวัสดุพื้นฐาน. (สุวนชัย พงษ์สุกิจวัฒน์ และคณะ, ผู้แปล). กรุงเทพฯ: สำนักพิมพ์อป.
- Calleja, J. M., Cardona, M. (1977). Resonant Raman scattering in ZnO. **Physical Review B**, 16, 3735.
- Chen, W., Zhao, L. F., Wang, Y. Q., Miao, J. H., Liu, S., Xia, Z. C., Yuan, S. L. (2005). Magnetism in Mn-doped ZnO bulk samples. **Solid State Communications**, 134, 827–830.
- Chen, S. J., Liu, Y. C., Lu, Y. M., Zhang, J. Y., Shen, D. Z., Fan, X. W. (2006). Photoluminescence and Raman behaviors of ZnO nanostructures with different morphologies. **Journal of Crystal Growth**, 289, 55–58.
- Chen, C. C., Liu, P., Lu, C. H. (2008). Synthesis and characterization of nano-sized ZnO powders by direct precipitation method. **Chemical Engineering Journal**, 144, 509–513.
- Chen, J., Deng, H., Wei, M. (2009). Hydrothermal synthesis and optical properties of ZnO single-crystal hexagonal microtubes. **Materials Science and Engineering B**, 163, 157–160.
- Cheng, C., Xu, G., Zhang, H., Luo, Y., Li, Y. (2008). Solution synthesis, optical and magnetic properties of $Zn_{1-x}Co_xO$ nanowires. **Materials Letters**, 62, 3733–3735.
- Cho, J. Y., Kim, I. K., Jung, I. K., Moon, J. H., Kim, J. H. (2009). Effects of Mg doping concentration on the band gap of $ZnO/ZnO/Mg_xZn_{1-x}O$ multilayer thin films prepared using pulsed laser deposition method. **Journal of Electroceramics**, 23, 442–446.
- Chu, S. Y., Yan, T. M., Chen, S. L. (2000). Analysis of ZnO varistors prepared by the sol-gel method. **Ceramics International**, 26, 733–737.
- Coey, J. M. D., Douvalis, A. P., Fitzgerald, C. B., & Venkatesan, M. (2004). Ferromagnetism in Fe-doped SnO_2 thin films. **Applied Physics Letters**, 84, 1332–1334.
- Coey, J. M. D., Venkatesan, M., & Fitzgerald, C. B. (2005). Donor impurity band exchange in dilute ferromagnetic oxides. **Nature Materials**, 4, 173–179.

- Cong, C. J., Liao, L., Li, J. C., Fan, L. X., Zhang, K. L. (2005). Synthesis, structure and ferromagnetic properties of Mn-doped ZnO nanoparticle. *Nanotechnology*, 16, 981–984.
- Cui, J., Zeng, Q., Gibson, U. J. (2006). Synthesis and magnetic properties of Co-doped ZnO nanowires. *Journal of Applied Physics*, 99, 08M113.
- Damen, T. C., Porto, S. P. S., Tell, B. (1966). Raman Effect in Zinc Oxide. *Physical Review*, 142, 570.
- Deka, S., Joy, P. A. (2005). Electronic structure and ferromagnetism of polycrystalline $Zn_{1-x}Co_xO$ ($0 \leq x \leq 0.15$). *Solid State Communications*, 134, 665–669.
- Dodd, A. C., McKinley, A. J., Saunders, M., Tsuzuki, T. (2006). Effect of particle size on the photocatalytic activity of nanoparticulate zinc oxide. *Journal of Nanoparticle Research*, 8, 43–51.
- Electromagnetic waves. (2004). ค้นเมื่อ 18 พ.ย. 2553, จาก <http://shariqa.com/waves%20around%20us.htm>
- Feng, L., Liu, A., Liu, M., Ma, Y., Wei, J., Man, B. (2010). Fabrication and characterization of tetrapod-like ZnO nanostructures prepared by catalyst-free thermal evaporation. *Materials Characterization*, 61, 128–133.
- Gopel, W., Lampe, U. (1980). Influence of defects on the electronic structure of zinc oxide surfaces. *Physical Review B*, 22, 6447.
- Han, S. J., Song, J. W., Yang, C. -H., Park, S. H., Park, J. -H., Jeong, Y. H., and Rhie, K. W. (2002). A key to room-temperature ferromagnetism in Fe-doped ZnO: Cu. *Applied Physics Letters*, 81, 4212–4214.
- Hamman, J. H. (2008). Composition and applications of *Aloe vera* leaf gel. *Molecules*, 13, 1599–1616.
- Hays, J., Reddy, K. M., Graces, N. Y., Engelhard, M. H., Shutthanandan, Luo, V. M., Xu, C., Giles, N. C., Wang, C., Thevuthasan, S., and Punnoose, A. (2007). Effect of Co doping on the structural, optical and magnetic properties of ZnO nanoparticles. *Journal of Physics: Condensed Matter*, 19, 266203.
- Hilo, M. E., Dakhel, A. A., Mohamed A. Y. A. (2009). Room temperature ferromagnetism in nanocrystalline Ni-doped ZnO synthesized by co-precipitation. *Journal of Magnetism and Magnetic Materials*, 321, 2279–2283.

- Hou, D. L., Ye, X. J., Meng, H. J., Zhou, H. J., Li, X. L., Zhen, C. M., Tang, G. D. (2007). Magnetic properties of Mn-doped ZnO powder and thin films. **Materials Science and Engineering B**, 138, 184–188.
- Housecroft, C. E., & Sharpe, A. G. (2001). **Inorganic chemistry**. London: Prentice Hall.
- Hsu, C. L., Chang, S. J., Lin, Y. R., Li, P. C., Lin, T. S., Tsai, S. Y., Lu, T. H., Chen, I. C. (2005). Ultraviolet photodetectors with low temperature synthesized vertical ZnO nanowires. **Chemical Physics Letters**, 416, 75–78.
- Information Storage Technology Group. (1997). **Vector vibrating sample Magnetometer**.
ค้นເມື່ອ 25 ກຸມພັນລີ 2553, ຈາກ <http://www.el.utwente.nl/tdm/istg/research/vsm/>
- Katoyama-Yoshida, H. & Sato, K. (2003). Spin and charge control method of ternary II-VI and III-V magnetic semiconductors for spintronics: theory vs experiment, **Journal of Physics and Chemistry**, 64, 1447–1452.
- Kima, S. W., Fujitab, S., Parka, H. K., Yangb, B., Kima, H. K., Yoonc , H. D. (2006). Growth of ZnO nanostructures in a chemical vapor deposition process. **Journal of Crystal Growth**, 292, 306–310.
- Kim, S. J., Kim, H. H., Kwona, J. B., Lee, J. G., Oa, B. H., Lee, S. G., Lee, E. H., Park, S. G. (2010). Novel fabrication of various size ZnO nanorods using hydrothermal method. **Microelectronic Engineering**, 87, 1534–1536.
- Kittilstved, K. R., Norberg, N. S., & Gamelin, D. R. (2005). Chemical Manipulation of High- T_c Ferromagnetism in ZnO diluted magnetic semiconductors. **Physical Review Letters**, 94, 147209 (1-4).
- Li, Y., Cheng, G. S., Zhang, L. D. (2000). Fabrication of highly ordered ZnO nanowire arrays in anodic alumina membranes. **Journal of Materials Research**, 15, 2305.
- Li, H., Wang, J., Liu, H., Yang, C., Xu, H., Li, X., Cui, H. (2004). Sol-gel preparation of transparent zinc oxide films with highly preferential crystal orientation. **Vacuum**, 77, 57.
- Li, Q., Kang, Z., Mao, B., Wang, E., Wang, C., Tian, C., Li, S. (2008). One-step polyoxometalate-assisted solvothermal synthesis of ZnO. **Materials Letters**, 62, 2531–2534.
- Li, H., Nia, Y., Hong. J. (2009). Ultrasound-assisted preparation, characterization and properties of flower-like ZnO microstructures. **Scripta Materialia**, 60, 524–527.

- Liang, L. Q., Pan, L. Z., Liu, Z. J. (2008). Synthesis and photoluminescence properties of ZnO nanowires and nanorods by thermal oxidation of Zn precursors. **Materials Letters**, 62, 1797–1800.
- Liu, C., Yun, F., Morkoc, H. (2005). Ferromagnetism of ZnO and GaN: A Review. **Journal of Physics: Condensed Matter**, 16, 555.
- Liu, J. J., Yu, M. H., Zhou, W. L. (2006). Fabrication of Mn-doped ZnO diluted magnetic semiconductor nanostructures by chemical vapor deposition. **Journal of Applied Physics**, 99, 08M119.
- Liu, H., Zhang, X., Li, L., Wang, Y. X., Gao, K. H., Li, Z. Q., Zheng, R. K., Ringer, S. P., Zhang, B., Zhang, X. X. (2007). Role of point defects in room-temperature ferromagnetism of Cr-doped ZnO. **Applied Physics Letters**, 91, 072511.
- Lupan, O., Chai, G., Chow, L. (2008). Novel hydrogen gas sensor based on single ZnO nanorod. **Microelectronic Engineering**, 85, 2220–2225.
- Lyu, S. C., Zhang, Y., Ruh, Y., Lee, H., Shim, H., Suh, E., Lee, C. J. (2002). Low temperature growth and photoluminescence of well-aligned zinc oxide nanowires. **Chemical Physics Letters**, 363, 134.
- Maensiri, S., Laokula, P., Promarakb, V. (2006). Synthesis and optical properties of nanocrystalline ZnO powders by a simple method using zinc acetate dihydrate and poly(vinyl pyrrolidone). **Journal of Crystal Growth**, 289, 102–106.
- Maensiri, S., Masingboon, C., Promarak, V., Seraphin, S. (2007). Synthesis and optical properties of nanocrystalline V-doped ZnO powders. **Optical Materials**, 29, 1700–1705.
- Maensiri, S., Laokul, P., Klinkaewnarong, Thomas, J. (2008). Structure and magnetic properties of $Zn_{0.9}Co_{0.1}O$ nanorods synthesized by a simple sol-gel method using metal acetylacetone and poly(vinyl alcohol). **Applied Physics A**, 94, 601–606.
- Masuda, T., Odaka, Y., Ogawa, N., Nakamoto, K., Kuninaga, H. (2008). Identification of geranic acid, a tyrosinase inhibitor in lemongrass (*Cymbopogon citratus*). **Journal of Agricultural and Food Chemistry**, 56, 597–601.
- Mende, L. S., Driscoll, J. L. M. (2007). ZnO-nanostructures, defects, and devices. **Materialstoday**, 10, 5.
- Mishra, P., Yadav, R. S., Pandey, A. C. (2010). Growth mechanism and photoluminescence property of flower-like ZnO nanostructures synthesized by starch-assisted sonochemical method. **Ultrasonics Sonochemistry**, 17, 560–565.

- Moballegh, A., Shahverdi, H. R., Aghababazadeh, R., Mirhabibi, A. R. (2007). ZnO nanoparticles obtained by mechanochemical technique and the optical properties. *Surface Science*, 601, 2850–2854.
- Monticone, S., Tufeu, R., Kanaev, A. V. (1998). Complex Nature of the UV and Visible Fluorescence of Colloidal ZnO Nanoparticles. *Journal of Physical Chemistry B*, 102, 2854.
- Pan, C. J., Hsu, H. C., Cheng, H. M., Wu, C. Y., Hsieh, W. F. (2007). Structural and optical properties of ZnMgO nanostructures formed by Mg in-diffused ZnO nanowires. *Journal of Solid State Chemistry*, 180, 1188–1192.
- Pan, F., Song, C., Liu, X. J., Yang, Y. C., Zeng, F. (2008). Ferromagnetism and possible application in spintronics of transition-metal-doped ZnO films. *Materials Science and Engineering R*, 62, 1–35.
- Park, J. H., Kim, M. G., Jang, H. M., Ryu, S. (2004). Co-metal clustering as the origin of ferromagnetism in Co-doped ZnO thin films. *Applied Physics Letters*, 84, 1338–1340.
- Pearton, S. J., Heo, Y. H., Ivill, V., Norton, D. P., Steiner, T. (2004). Dilute magnetic semiconducting oxides. *Semiconductor Science and Technology*, 19, R1–R16.
- Pearton S., Norton D., Ipa K., Heo Y., Steiner T. (2003). Recent progress in processing and properties of ZnO. *Superlattices Microstruct*, 34, 3–32.
- Peng, W. Q., Qu, S. C., Cong, G. W., Wang, Z. G. (2006). Synthesis and temperature-dependent near-band-edge emission of chain-like Mg-doped ZnO nanoparticles. *Applied Physics Letters*, 88, 101902.
- Qi, J., Yang, Y., Zhang, Li., Chi, J., Gao, D., Xue, D. (2009). Room-temperature ferromagnetism in Er-doped ZnO thin films. *Scripta Materialia*, 60, 289–292.
- Rajalakshmi, M., Arora, A. K., Bendre, B. S., Mahamuni, S. (2000). Optical Phonon Confinement in Zinc Oxide Nanoparticles. *Journal of Applied Physics*, 87, 2445.
- Roth, W. L. (1964). The magnetic structure of Co_3O_4 . *Journal of Physics and Chemistry of Solids*, 25, 1.
- Service, R. F. (1997). Will UV Lasers Beat the Blues?. *Science*, 276, 895.
- Silva, R. F., Zaniquelli, M. E. D. (2001). Morphology of nanometric size particulate aluminium-doped zinc oxide films. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 198–200, 551–558.

- Smith, W. F. (2006). วัสดุวิศวกรรม. (ແມ່ນ ອມຮສີທີ່ ແລະ ສນ້ຍ ອັດຕິວາ, ຜູ້ແປລ). กรຸງເທິພານາຄຣ: ສຳນັກພິມພໍທ້ອປ.
- Shannon, R. D. (1976). "Revised effective ionic radii and systematic studies of interatomic distances in halides and chalcogenides". *Acta Crystallographica Section A. Crystal Physics, Diffraction, Theoretical and General Crystallography. Crystallogr.* 32, 751–767.
- Shan, F. K., Kim, B. I., Liu, G. X., Liu, Z. F., Sohn, J. Y., Lee, W. J., Shin, B. C., Yu, Y. S. (2004). Blueshift of near band edge emission in Mg doped ZnO thin films and aging. *Journal of Applied Physics*, 95, 9.
- Sharma, V. K., Varma, G. D. (2008). Co nanoclusters as origin of ferromagnetism in sol-gel synthesized $Zn_{1-x}Co_xO$ ($x = 0.05, 0.10$ and 0.15) samples. *Crystal Research and Technology*, 43, 1046–1051.
- Song, R., Liu, Y., He, L. (2008). Synthesis and characterization of mercaptoacetic acid-modified ZnO nanoparticles. *Solid State Sciences*, 10, 1563–1567.
- Spaldin, N. A. (2003). **Magnetic materials fundamentals and device applications.** United Kingdom: Cambridge.
- Sun, X. M., Chen, X., Deng, Z. X., Li, Y. D. (2002). A CTAB-assisted hydrothermal orientation growth of ZnO nanorods. *Materials Chemistry and Physics*, 78, 99–104.
- Theodoropoulou, N. A., Hebard, A. F., Norton, D. P., Budai, J. D., Boatner, L. A., Lee, J. S., Khim, Z. G., Park, Y. D., Overberg, M. E., Pearton, S. J., Wilson, R. G. (2003). Ferromagnetism in Co- and Mn-doped ZnO. *Solid-State Electron*, 47, 2231.
- Tonto, P., Mekasuwandumrong, O., Phatanasri, S., Pavarajarn, V., Praserthdam, P. (2008). Preparation of ZnO nanorod by solvothermal reaction of zinc acetate in various alcohols. *Ceramics International*, 34, 57–62.
- Ueda, K., Tabata, H., Kawai, T. (2001). Magnetic and electric properties of transition-metal-doped ZnO films. *Applied Physics Letters*, 79, 988.
- Umar, A., Kim, S. H., Suh, E. -K., Hahn, Y. B. (2007). Effect of hydrogen pretreatment combined with growth temperature on the morphologies of ZnO nanostructures: Structural and optical properties. *Journal of Crystal Growth*, 306, 52–61.

- Umar, A., Hajryb, A. A., Hahnc, Y. B., Kimd, D. H. (2009). Rapid synthesis and dye-sensitized solar cell applications of hexagonal-shaped ZnO nanorods. **Electrochimica Acta**, 54, 5358–5362.
- Vanheusden, K., Warren, W. L., Sesger, C. H., Tallant, D. R., Voigt, J. A., Gnage, B. E. (1996). Mechanisms behind green photoluminescence in ZnO phosphor powders. **Journal of Applied Physics**, 79, 7983.
- Wang, J., Gao, L. (2004). Hydrothermal synthesis and photoluminescence properties of ZnO nanowires. **Solid State Comm**, 132, 269.
- Wang, Z. L., Song, J. H. (2006). Piezoelectric Nanogenerators Based on Zinc Oxide Nanowire Arrays. **Science**, 312, 242.
- Wang, Y. S. (2007). ZnO and Mg_xZn_{1-x}O nanocrystals grown by non-hydrolytic route. **Journal of Crystal Growth**, 304, 393–398.
- Wang, Z. H., Geng, D. Y., Han, Z., Zhang, Z. D. (2009). Characterization and optical properties of ZnO nanoparticles obtained by oxidation of Zn nanoparticles. **Materials Letters**, 63, 2533–2535.
- Wang, R. C., Tsai, C. C. (2009). Efficient synthesis of ZnO nanoparticles, nanowalls, and nanowires by decomposition of zinc acetate at a low temperature. **Applied Physics A**, 94, 241–245.
- Wanga, D. Y., Zhoua, J., Liu G. Z. (2009). Effect of Li-doped concentration on the structure, optical and electrical properties of p-type ZnO thin films prepared by sol-gel method. **Journal of Alloys and Compounds**, 481, 802–805.
- Willian, D., & Callister, Jr. (2001). **Fundamentals of Materials Science and Engineering**. United States of America: John Wiley & Sons.
- Xiao, Q., Huang, S., Zhang, J., Xiao, C., Tan, X. (2008). Sonochemical synthesis of ZnO nanosheet. **Journal of Alloys and Compounds**, 459, L18–L22.
- Yang, L. W., Wu, X. L., Qiu, T., Siu, G.G., Chu, P. K. (2006). Synthesis and magnetic properties of Zn_{1-x}Co_xO nanorods. **Journal of Applied Physics**, 99, 074303.
- Yang, L., Wang, G., Tang, C., Wang, H., Zhang, L. (2005). Synthesis and photoluminescence of corn-like ZnO nanostructures under solvothermal-assisted heat treatment. **Chemical Physics Letters**, 409, 337–341.

- Yang, H., Li, Y., Norton, D. P., Pearton, S. J., Jung, S., Ren, F., Boatner, L. A. (2005). Characteristics of unannealed ZnMgO/ZnO *p-n* junctions on bulk (100) ZnO substrates. **Applied Physics Letters**, 86, 172103.
- You, Y. Z., Fukumura, T., Jin, Z., Hasegawa, K., Kawasaki, M., Ahmet, P., Chikyow, T., Koinuma, H. (2001). ZnO-CoO solid solution thin flims. **Journal of Applied Physics**, 90, 4246.
- Ziegler, E., Heinrich, A., Oppermann, H., Stover, G. (1981). Electrical properties and non-stoichiometry in ZnO single crystal. **Physica Status Solidi (A) Applied Reserch**, 66, 635–648.
- Zinc Oxide. (2008). ค้นเมื่อ 24 มิ.ย 2553, จาก <http://www.answers.com/topic/zinc-oxide>
- Zhao, X., Zheng, B., Li, C., Gu, H. (1998). Acetate-derived ZnO ultrafine particles synthesizes by spray pyrolysis. **Powder Technology**, 100, 20–23.
- Zhao, M., Wu, D., Chang, J., Bai, Z., Jiang, K. (2009). Synthesis of cup-like ZnO microcrystals via a CTAB-assisted hydrothermal route. **Materials Chemistry and Physics**, 117, 422–424.
- Zhao, M., Wang, X., Ning, L., He, H., Jia, J., Zhang, L., Li, X. (2011). Synthesis and optical properties of Mg-doped ZnO nanofibers prepared by electrospinning. **Journal of Alloys and Compounds**, 507, 97–100.
- Zhang, X. L., Qiao, R., Qiu, R., Li, Y., Kang, Y. S. (2007). Synthesis and Magnetic Properties of One-Dimensional Zinc Nickel Oxide Solid Solution. **Journal of Physical Chemistry A**, 111, 4195–4198.
- Zhang, Y. Z., Lu1, J. G., Ye1, Z. Z., Zeng, Y. J., Zhu, L. P., Huang, J. Y. (2007). Quasi-aligned $Zn_{1-x}Mg_xO$ nanorods synthesized by thermal evaporation. **Journal of Physics D**, 40, 3490–349.
- Zu, P., Tang, Z. K., Wong, G. K. L., Kawasaki, M., Ohtomo, A., Koinuma, H., Segawa, Y. (1997). Ultraviolet spontaneous and stimulated emissions prob ZnO microcrystallite thin Films at room temperature. **Solid State Commun**, 103, 459.

ภาคผนวก

การเผยแพร่วิทยานิพนธ์

ผลงานตีพิมพ์ในเอกสารการประชุมระดับชาติ

1. Labuayai S, Maensiri S. Synthesis and structural of ferromagnetism in $Zn_{0.925}Mn_{0.075}O$ nanowires prepared by a direct thermal decomposition route. In The Siam Physics Congress (SPC) 2009. Cha-am, Phetchburi, Thailand, 19–21 March 2009. (Poster)
2. Labuayai S, Maensiri S. Effect of Co doping on the structural, optical and magnetic properties of ZnO nanorods prepared by a direct thermal decomposition route. In The Siam Physics Congress (SPC) 2010. River Kwai Village Hotel, Kanchanaburi, Thailand, 25–27 March 2010. (Poster)

ผลงานตีพิมพ์ในวารสารระดับนานาชาติ

1. Labuayai, S., Promarak, V., and Maensiri, S., Synthesis and optical properties of nanocrystalline ZnO powders prepared by a direct thermal decomposition route. **Applied Physics A.** 94 (2009) 755–761.
2. Labuayai, S., Promarak, V., and Maensiri, S., Optical properties of $Mg_xZn_{1-x}O$ nanoparticles synthesized by a direct thermal decomposition route. **Journal of Optoelectronics and Advanced Materials–Rapid Communication.** 2 (2008) 798–801.



ประวัติผู้เขียน

นายศราวุต ลับว้าใหญ่ เกิดเมื่อวันที่ 1 มิถุนายน พ.ศ. 2527 จังหวัดอุตรธานี เป็นบุตรคนแรก ของนายชัยยุทธ ลับว้าใหญ่ และนางพิกุล ลับว้าใหญ่ สำเร็จการศึกษาระดับประถมจากโรงเรียนบ้านหมากแขวง และเข้าศึกษาต่อระดับมัธยมศึกษาที่โรงเรียนประจักษ์ศิลป์ป่าcar หลังจากนั้นได้เข้าศึกษาต่อในระดับปริญญาตรี สาขาวิชาฟิสิกส์ คณะวิทยาศาสตร์ มหาวิทยาลัยราชภัฏอุตรธานีในปีการศึกษา 2546 และสำเร็จการศึกษาระดับปริญญาตรีในปีการศึกษา 2550

ในปี พ.ศ. 2552 ได้เข้าศึกษาต่อในระดับปริญญาโท สาขาวิชาวัสดุศาสตร์และนาโนเทคโนโลยี คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น โดยเลือกทำวิทยานิพนธ์เรื่อง การสังเคราะห์อิมเปิล์บไนโตรเจนและศึกษาลักษณะเฉพาะของโครงสร้างนาโนกัม ZnO และสำเร็จการศึกษาระดับปริญญาโทในปีการศึกษา 2554

