

REFERENCES

- [1] Martin A. Green, Keith Emery, Yoshihiro Hishikawa, Wilhelm Warta, and Ewan D. Dunlop, "Solar cell efficiency tables (Version 45)," *Progress in Photovoltaics: Research and Applications*, Vol 23, No 1, 2015, pp. 1-9
- [2] Vasilis Fthenakis, James E. Mason, and Ken Zweibel, "The technical, geographical, and economic feasibility for solar energy to supply the energy needs of the US," *Energy Policy*, Vol. 37, No. 2, 2009, pp. 387-399.
- [3] Joseph J. Loferski, "Theoretical Considerations Governing the Choice of the Optimum Semiconductor for Photovoltaic Solar Energy Conversion," *Journal of Applied Physics*, Vol 27, No 7, 1956, pp. 777-784.
- [4] J. Katayama, K. Ito, M. Matsuoka, and J. Tamaki, "Performance of Cu₂O/ZnO solar cell prepared by two-step electrodeposition," *Journal of Applied Electrochemistry*, Vol 34, No 7, 2004, pp. 687-692.
- [5] Yung-Sheng Chen, Che-Hao Liao, Yu-Lun Chueh, Chih-Chung Lai, Li-Yin Chen, Ann-Kuo Chu, Chie-Tong Kuo, and Hsiang-Chen Wang, "High performance Cu₂O/ZnO core-shell nanorod arrays synthesized using a nanoimprint GaN template by the hydrothermal growth technique," *Optical Materials Express*, Vol 4, No 7, 2014, pp. 1473-1486.
- [6] S. Noda, H. Shima, and H. Akinaga, "Cu₂O/ZnO heterojunction solar cells fabricated by magnetron-sputter deposition method films using sintered ceramics targets," *Journal of Physics: Conference Series*, Vol 433, No 1, 2013.
- [7] N. Soundaram, R. Chandramohan, S. Valanarasu, R. Thomas, and A. Kathalingam, "Studies on SILAR deposited Cu₂O and ZnO films for solar

cell applications," *Journal of Materials Science: Materials in Electronics*, Vol 26, No 7, 2015, pp. 5030-5036.

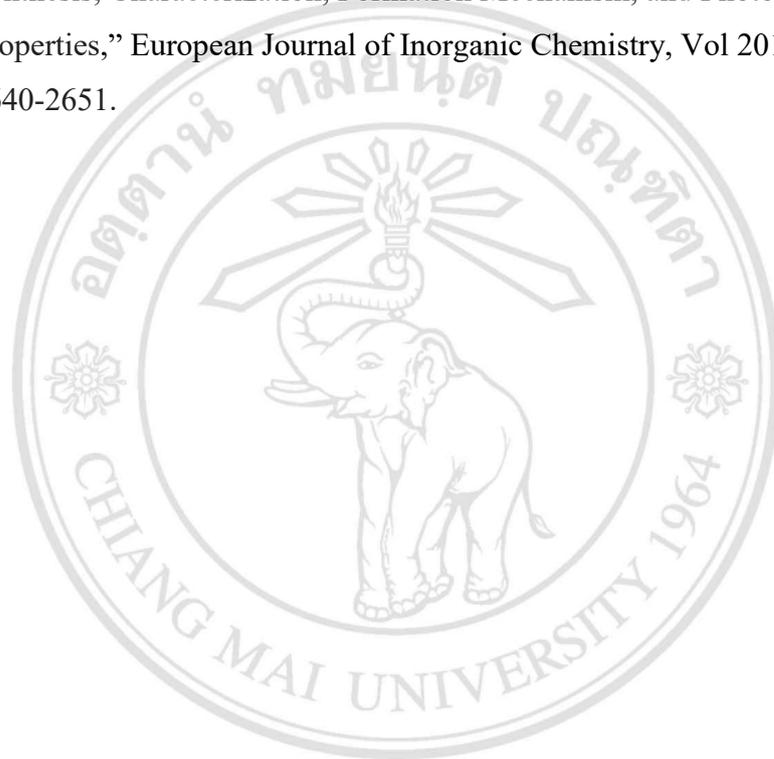
- [8] Marwa Abd-Ellah, Joseph P. Thomas, Lei Zhang, and Kam Tong Leung, "Enhancement of solar cell performance of p-Cu₂O/n-ZnO-nanotube and nanorod heterojunction devices," *Solar Energy Materials and Solar Cells*, Vol 152, 2016, pp. 87-93.
- [9] S. S. Jeong, A. Mittiga, E. Salza, A. Masci, and S. Passerini, "Electrodeposited ZnO/Cu₂O heterojunction solar cells," *Electrochimica Acta*, Vol 53, No 5, 2008, pp. 2226-2231.
- [10] P. Nunes, E. Fortunato, P. Tonello, F. Braz Fernandes, P. Vilarinho and R. Martins, "Effect of different dopant elements on the properties of ZnO thin films," *Vacuum*, Vol 64, 2002, pp. 281-285.
- [11] F. Maldonado and A. Stashans, "Al-doped ZnO: Electronic, electrical and structural properties," *Journal of Physics and Chemistry of Solids*, Vol 71, 2010, pp. 784-787.
- [12] P. Raghu, N. Srinatha, C.S. Naveen, H.M. Mahesh and B. Angadi, "Investigation on the effect of Al concentration on the structural, optical and electrical properties of spin coated Al:ZnO thin films," *Journal of Alloys and Compounds*, Vol 694, 2017, pp. 68-75.
- [13] Mahmoud Abdelfatah, Johannes Ledig, Abdelhamid El-Shaer, Alexander Wagner, Vicente Marin-Borras, Azat Sharafeev, Peter Lemmens, Mohsen Mohamed Mosaad, Andreas Waag, and Andrey Bakin, "Fabrication and characterization of low cost Cu₂O/ZnO:Al solar cells for sustainable photovoltaics with earth abundant materials," *Solar Energy Materials and Solar Cells*, Vol 145, No 3, 2016, pp. 454-461.
- [14] M. Mozibur Rahman, M. K. R. Khan, M. Rafiqul Islam, M. A. Halim, M. Shahjahan, M. A. Hakim, Dilip Kumar Saha, and Jasim Uddin Khan, "Effect of Al Doping on Structural, Electrical, Optical and

Photoluminescence Properties of Nano-Structural ZnO Thin Films," Journal of Materials Science & Technology, Vol 28, No 4, 2012, pp. 329-335.

- [15] Takeo Oku, Tetsuya Yamada, Kazuya Fujimoto, and Tsuyoshi Akiyama, "Microstructures and Photovoltaic Properties of Zn(Al)O/Cu₂O-Based Solar Cells Prepared by Spin-Coating and Electrodeposition," Coatings, Vol 4, No 2, 2014, pp. 203-213.
- [16] M. Shirazi, R.S. Dariani, M.R. Toroghinejad, "Efficiency enhancement of hole conductor-free perovskite solar cell based on ZnO nanostructure by Al doping in ZnO," Journal of Alloys and Compounds, 2016.
- [17] Kevin P. Musselman, Andrew Marin, Lukas Schmidt-Mende, and Judith L. MacManus-Driscoll, "Incompatible Length Scales in Nanostructured Cu₂O Solar Cells," Advanced Functional Materials, Vol 22, No 10, 2012, pp. 2202-2208.
- [18] W. Thongsuwan, T. Kumpika, and P. Singjai, "Effect of high roughness on a long aging time of superhydrophilic TiO₂ nanoparticle thin films," Current Applied Physics, Vol 11, No 5, 2011. pp. 1237-1242.
- [19] Michael Nolan and Simon D. Elliott, "The p-type conduction mechanism in Cu₂O: A first principles study," Physical Chemistry Chemical Physics, Vol 8, No 45, 2006, pp. 5350-5358.
- [20] W. Thongsuwan and P. Singjai, "Influence of TiO₂/Fe₂O₃ interfacial layers on optical properties under visible light," Surface & Coatings Technology, Vol 306, 2016, pp. 49–53.
- [21] P. Shahbazi and A. Kiani, "Fabricated Cu₂O porous foam using electrodeposition and thermal oxidation as a photocatalyst under visible light toward hydrogen evolution from water," International Journal of Hydrogen Energy, Vol 41, No 39, 2016, pp. 17247–17256.

- [22] Scanning Electron Microscope: SEM, website:
<http://web2.mfu.ac.th/center/stic/micro-analysis-instrument-menu/item/96-scanning-electron-microscope.html>, 20 May 2017.
- [23] Deriving an informal interpretation of Bragg's Law, website:
http://www.xtal.iqfr.csic.es/Cristalografia/parte_05_5-en.html, 20 May 2017.
- [24] Ultraviolet and visible spectroscopy, website:
[https://chem.libretexts.org/Textbook_Maps/Organic_Chemistry_Textbook_Maps/Map%3A_Organic_Chemistry_with_a_Biological_Emphasis_\(Soderberg\)/Chapter_04%3A_Structure_Determination_I/4.4%3A_Ultraviolet_and_visible_spectroscopy](https://chem.libretexts.org/Textbook_Maps/Organic_Chemistry_Textbook_Maps/Map%3A_Organic_Chemistry_with_a_Biological_Emphasis_(Soderberg)/Chapter_04%3A_Structure_Determination_I/4.4%3A_Ultraviolet_and_visible_spectroscopy), 20 May 2017.
- [25] D.N. Montenegro, V. Hortelano, O. Martínez, M.C. Martínez-Tomas, V. Sallet, V. Muñoz-Sanjose and J. Jiménez, “Non-radiative recombination centres in catalyst-free ZnO nanorods grown by atmospheric-metal organic chemical vapour deposition,” *Journal of Physics D: Applied Physics*, Vol 46, 2013, pp. 235302.
- [26] Y. Liu, H. Zhang, X. An, C. Gao, Z. Zhang, J. Zhou, M. Zhou and E. Xie, “Effect of Al doping on the visible photoluminescence of ZnO nanofibers,” *Journal of Alloys and Compounds*, Vol 506, 2010, pp. 772-776.
- [27] X. Wang and Y. Zhang, “The effects of UV radiation on the structure and properties of AZO thin films deposited on quartz glass by magnetron sputtering,” *Materials Letters*, Vol 188, 2017, pp. 257-259.
- [28] C. H. Zhai, R. J. Zhang, X. Chen, Y. X. Zheng, S. Y. Wang, J. Liu, N. Dai and L. Y. Chen, “Effects of Al Doping on the Properties of ZnO Thin Films Deposited by Atomic Layer Deposition,” *Nanoscale Research Letters*, Vol 11, 2016, pp. 407-414.

- [29] H. m. Zhou, D. q. Yi, Z.m. Yu, L. r. Xiao and J. Li, "Preparation of aluminum doped zinc oxide films and the study of their microstructure, electrical and optical properties," *Thin Solid Films*, Vol 515, 2007, pp. 6909-6914.
- [30] Anshu Singhal, Mrinal R. Pai, Rekha Rao, Kodanthakurup T. Pillai, Ingo Lieberwirth, and Avesh K. Tyagi. Copper(I) Oxide Nanocrystals – One Step Synthesis, Characterization, Formation Mechanism, and Photocatalytic Properties," *European Journal of Inorganic Chemistry*, Vol 2013, 2013, pp. 2640-2651.



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