

REFERENCES

- [1] M. Roco, The long view of nanotechnology development: the National Nanotechnology Initiative at 10 years, *J Nanopart Res*, 13(2011) 427-45.
- [2] K. Barbara, S.W. Stanislaus, Ten Years of Green Nanotechnology, Sustainable Nanotechnology and the Environment: Advances and Achievements, American Chemical Society 2013, pp. 1-10.
- [3] J.M. Pearce, Physics: Make nanotechnology research open-source, *Nature*, 491(2012) 519-21.
- [4] C. Klingshirn, Introduction, Zinc Oxide, Springer Berlin Heidelberg 2010, pp. 1-6.
- [5] C.A. Aguilar, H.G. Craighead, Micro- and nanoscale devices for the investigation of epigenetics and chromatin dynamics, *Nat Nano*, 8(2013) 709-18.
- [6] D. Akinwande, N. Petrone, J. Hone, Two-dimensional flexible nanoelectronics, *Nat Commun*, 5(2014).
- [7] P. Iqbal, J.A. Preece, P.M. Mendes, Nanotechnology: The “Top-Down” and “Bottom-Up” Approaches, *Supramolecular Chemistry*, John Wiley & Sons, Ltd 2012.
- [8] A. Correia, J.J. Sáenz, P. Ordejón, Trends in Nanotechnology (TNT2007), *physica status solidi (a)*, 205(2008) 1245-8.
- [9] D.W. Hobson, Commercialization of nanotechnology, *Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology*, 1(2009) 189-202.

- [10] C. Huang, R. Shi, A. Amini, Z. Wu, S. Xu, L. Zhang, et al., Hierarchical ZnO Nanostructures with Blooming Flowers Driven by Screw Dislocations, *Sci Rep*, 5(2015).
- [11] L. Peng, L. Hu, X. Fang, Low-Dimensional Nanostructure Ultraviolet Photodetectors, *Advanced Materials*, 25(2013) 5321-8.
- [12] Z.R. Dai, Z.W. Pan, Z.L. Wang, Novel Nanostructures of Functional Oxides Synthesized by Thermal Evaporation, *Advanced Functional Materials*, 13(2003) 9-24.
- [13] S. Zeng, D. Baillargeat, H.-P. Ho, K.-T. Yong, Nanomaterials enhanced surface plasmon resonance for biological and chemical sensing applications, *Chemical Society Reviews*, 43(2014) 3426-52.
- [14] P. Kerativitayanan, J.K. Carrow, A.K. Gaharwar, Nanomaterials for Engineering Stem Cell Responses, *Advanced Healthcare Materials*, 4(2015) 1600-27.
- [15] C. Buzea, I.I. Pacheco, K. Robbie, Nanomaterials and nanoparticles: Sources and toxicity, *Biointerphases*, 2(2007) MR17-MR71.
- [16] C. Jagadish, S. Pearton, Foreword, in: C. Jagadish, S. Pearton (Eds.), *Zinc Oxide Bulk, Thin Films and Nanostructures*, Elsevier Science Ltd, Oxford, 2006, pp. vii-ix.
- [17] Ü. Özgür, Y.I. Alivov, C. Liu, A. Teke, M.A. Reshchikov, S. Doğan, et al., A comprehensive review of ZnO materials and devices, *Journal of Applied Physics*, 98(2005) 041301.
- [18] E. Wongrat, Gas Sensing Properties of Metal Adding Zinc Oxide Nanostructures Sensors, Thesis, Chiang Mai University, (2012).
- [19] P. Pimpang, Characterization of Zinc Oxide Gold Nanocomposites Synthesized by Photodeposition Technique for Nanodevice Applications, Thesis, Chiang Mai University, (2014).

- [20] Z.L. Wang, ZnO nanowire and nanobelt platform for nanotechnology, *Materials Science and Engineering R*, 64 (2009) 33-71.
- [21] Z.R.D. Zheng Wei Pan, Zhong Lin Wang, Nanobelts of Semiconducting Oxides, *SCIENCE*, 291(2001) 1947-8.
- [22] M. Arakha, M. Saleem, B.C. Mallick, S. Jha, The effects of interfacial potential on antimicrobial propensity of ZnO nanoparticle, *Sci Rep*, 5(2015).
- [23] L.E.G. Matt Law, Justin C.Johnson, Richard Saykally & Peidong Yang, Nanowire dye-sensitized solar cells, *nature materials*, 4(2005) 455-9.
- [24] Y.Z. Husnu Emrah Unalan, Pritesh Hiralal, Sharvari Dalal, Daping Chu,, K.B.K.T. Goki Eda, Manish Chhowalla, William I. Milne, and, G.A.J. Amaratunga, Zinc oxide nanowire networks for macroelectronic devices, *APPLIED PHYSICS LETTERS*, 94(2009).
- [25] X.Y.K.a.Z.L. Wang, Spontaneous Polarization-Induced Nanohelices, Nanosprings, and Nanorings of Piezoelectric Nanobelts, 3(2003) 1625-31.
- [26] X. Jin, M. Götz, S. Wille, Y.K. Mishra, R. Adelung, C. Zollfrank, A Novel Concept for Self-Reporting Materials: Stress Sensitive Photoluminescence in ZnO Tetrapod Filled Elastomers, *Advanced Materials*, 25(2013) 1342-7.
- [27] O. Lupan, L. Chow, G. Chai, A single ZnO tetrapod-based sensor, *Sensors and Actuators B: Chemical*, 141(2009) 511-7.
- [28] S. Brovelli, R.D. Schaller, S.A. Crooker, F. García-Santamaría, Y. Chen, R. Viswanatha, et al., Nano-engineered electron-hole exchange interaction controls exciton dynamics in core-shell semiconductor nanocrystals, *Nat Commun*, 2(2011) 280.
- [29] M.R. Alenezi, S.J. Henley, S.R.P. Silva, On-chip Fabrication of High Performance Nanostructured ZnO UV Detectors, *Sci Rep*, 5(2015).

- [30] N. Gogurla, A.K. Sinha, S. Santra, S. Manna, S.K. Ray, Multifunctional Au-ZnO Plasmonic Nanostructures for Enhanced UV Photodetector and Room Temperature NO Sensing Devices, *Sci Rep*, 4(2014).
- [31] J.-H. Lin, R.A. Patil, R.S. Devan, Z.-A. Liu, Y.-P. Wang, C.-H. Ho, et al., Photoluminescence mechanisms of metallic Zn nanospheres, semiconducting ZnO nanoballoons, and metal-semiconductor Zn/ZnO nanospheres, *Sci Rep*, 4(2014).
- [32] X. Bian, H. Jin, X. Wang, S. Dong, G. Chen, J.K. Luo, et al., UV sensing using film bulk acoustic resonators based on Au/n-ZnO/piezoelectric-ZnO/Al structure, *Sci Rep*, 5(2015).
- [33] W.Z. Liu, H.Y. Xu, J.G. Ma, C.Y. Liu, Y.X. Liu, Y.C. Liu, Effect of oxygen-related surface adsorption on the efficiency and stability of ZnO nanorod array ultraviolet light-emitting diodes, *Applied Physics Letters*, 100(2012) 203101.
- [34] A. Koka, H.A. Sodano, High-sensitivity accelerometer composed of ultra-long vertically aligned barium titanate nanowire arrays, *Nat Commun*, 4(2013).
- [35] S.A. Morin, A. Forticaux, M.J. Bierman, S. Jin, Screw Dislocation-Driven Growth of Two-Dimensional Nanoplates, *Nano Letters*, 11(2011) 4449-55.
- [36] N. Hongsoth, T. Chairuangsi, T. Phaechamud, S. Choopun, Growth kinetic and characterization of tetrapod ZnO nanostructures, *Solid State Communications*, 149(2009) 1184-7.
- [37] R. Yang, Z.L. Wang, Interpenetrative and transverse growth process of self-catalyzed ZnO nanorods, *Solid State Communications*, 134(2005) 741-5.
- [38] P.X. Gao, C.S. Lao, W.L. Hughes, Z.L. Wang, Three-dimensional interconnected nanowire networks of ZnO, *Chemical Physics Letters*, 408(2005) 174-8.

- [39] D. Gedamu, I. Paulowicz, S. Kaps, O. Lupan, S. Wille, G. Haidarschin, et al., Rapid Fabrication Technique for Interpenetrated ZnO Nanotetrapod Networks for Fast UV Sensors, *Advanced Materials*, 26(2014) 1541-50.
- [40] S.-W. Kim, H.-K. Park, M.-S. Yi, N.-M. Park, J.-H. Park, S.-H. Kim, et al., Epitaxial growth of ZnO nanowall networks on GaN/sapphire substrates, *Applied Physics Letters*, 90(2007) 033107.
- [41] W.d.N.M. Adriana Veloso Maciel, Vânia Márcia Duarte Pasa, A Novel Synthesis of Nanostructured ZnO via Thermal Oxidation of Zn Nanowires Obtained by a Green Route, *Materials Sciences and Applications 2010*, pp. 279-84.
- [42] S. Choopun, E. Wongrat, N. Hongstith, *Metal-Oxide Nanowires for Gas Sensors: INTECH Open Access Publisher; 2012.*
- [43] C.H. Xu, H.F. Lui, C. Surya, Synthetics of ZnO nanostructures by thermal oxidation in water vapor containing environments, *Materials Letters*, 65(2011) 27-30.
- [44] L. Yuan, C. Wang, R. Cai, Y. Wang, G. Zhou, Temperature-dependent growth mechanism and microstructure of ZnO nanostructures grown from the thermal oxidation of zinc, *Journal of Crystal Growth*, 390(2014) 101-8.
- [45] K.I. Rybakov, E.A. Olevsky, E.V. Krikun, *Microwave Sintering: Fundamentals and Modeling*, *Journal of the American Ceramic Society*, 96(2013) 1003-20.
- [46] M. Gupta, E.W. Wai Leong, *Introduction to Microwaves*, *Microwaves and Metals*, John Wiley & Sons (Asia) Pte Ltd 2007, pp. 1-23.
- [47] M. Gupta, E.W. Wai Leong, *Microwaves – Theory*, *Microwaves and Metals*, John Wiley & Sons (Asia) Pte Ltd 2007, pp. 25-41.
- [48] R. Al-Gaashani, S. Radiman, N. Tabet, A.R. Daud, Effect of microwave power on the morphology and optical property of zinc oxide nano-structures

prepared via a microwave-assisted aqueous solution method, *Materials Chemistry and Physics*, 125(2011) 846-52.

- [49] S. Chandrasekaran, S. Ramanathan, T. Basak, Microwave material processing—a review, *AIChE Journal*, 58(2012) 330-63.
- [50] K. Kaewyai, S. Choopun, M. Thepnurat, A. Gardchareon, S. Phadunhitidhada, D. Wongratanaphisan, Preparation and Characterization of Copper Oxide Nanofibers by Microwave-Assisted Thermal Oxidation, *Journal of Nanoelectronics and Optoelectronics*, 8(2013) 472-6.
- [51] P. Lidström, J. Tierney, B. Wathey, J. Westman, Microwave assisted organic synthesis—a review, *Tetrahedron*, 57(2001) 9225-83.
- [52] W. Chen, B. Gutmann, C.O. Kappe, Characterization of Microwave-Induced Electric Discharge Phenomena in Metal–Solvent Mixtures, *ChemistryOpen*, 1(2012) 39-48.
- [53] C. Wang, L. Yin, L. Zhang, D. Xiang, R. Gao, Metal Oxide Gas Sensors: Sensitivity and Influencing Factors, *Sensors*, 10(2010) 2088.
- [54] N. Hongstith, E. Wongrat, T. Kerdcharoen, S. Choopun, Sensor response formula for sensor based on ZnO nanostructures, *Sensors and Actuators B: Chemical*, 144(2010) 67-72.
- [55] E. Comini, G. Sberveglieri, Metal oxide nanowires as chemical sensors, *Materials Today*, 13(2010) 36-44.
- [56] R. Binions, A.J.T. Naik, 13 - Metal oxide semiconductor gas sensors in environmental monitoring A2 - Jaaniso, Raivo, in: O.K. Tan (Ed.) *Semiconductor Gas Sensors*, Woodhead Publishing 2013, pp. 433-66.
- [57] K. Schroën, *Micro- and Nanoengineering: Relevance in Food Processing*, Reference Module in Food Science, Elsevier 2016.

- [58] N. Yamazoe, K. Shimano, 1 - Fundamentals of semiconductor gas sensors A2 - Jaaniso, Raivo, in: O.K. Tan (Ed.) Semiconductor Gas Sensors, Woodhead Publishing 2013, pp. 3-34.
- [59] N. Ramgir, N. Datta, M. Kaur, S. Kailasaganapathi, A.K. Debnath, D.K. Aswal, et al., Metal oxide nanowires for chemiresistive gas sensors: Issues, challenges and prospects, Colloids and Surfaces A: Physicochemical and Engineering Aspects, 439(2013) 101-16.
- [60] D. Briand, J. Courbat, 6 - Micromachined semiconductor gas sensors A2 - Jaaniso, Raivo, in: O.K. Tan (Ed.) Semiconductor Gas Sensors, Woodhead Publishing 2013, pp. 220-60.
- [61] G. Eranna, Metal Oxide Nanostructures as Gas Sensing Devices, (2011) 13-26.
- [62] P.E. Hockberger, A History of Ultraviolet Photobiology for Humans, Animals and Microorganisms, Photochemistry and Photobiology, 76(2002) 561-79.
- [63] M.A. Mainster, Violet and blue light blocking intraocular lenses: photoprotection versus photoreception, British Journal of Ophthalmology, 90(2006) 784-92.
- [64] W.S. Stark, K.E.W.P. Tan, Ultraviolet Light: Photosensitivity and Other Effects on the Visual System, Photochemistry and Photobiology, 36(1982) 371-80.
- [65] A.R. Svobodová, A. Galandáková, J. Šianská, D. Doležal, R. Lichnovská, J. Ulrichová, et al., DNA damage after acute exposure of mice skin to physiological doses of UVB and UVA light, Archives of Dermatological Research, 304(2012) 407-12.
- [66] T.M. Nolan, N. DiGirolamo, N.H. Sachdev, T. Hampartzoumian, M.T. Coroneo, D. Wakefield, The Role of Ultraviolet Irradiation and Heparin-

Binding Epidermal Growth Factor-Like Growth Factor in the Pathogenesis of Pterygium, *The American Journal of Pathology*, 162 567-74.

- [67] Boundless, *Boundless Physics* 2016.
- [68] S. Bai, W. Wu, Y. Qin, N. Cui, D.J. Bayerl, X. Wang, High-Performance Integrated ZnO Nanowire UV Sensors on Rigid and Flexible Substrates, *Advanced Functional Materials*, 21(2011) 4464-9.
- [69] O. Lupan, G. Chai, L. Chow, G.A. Emelchenko, H. Heinrich, V.V. Ursaki, et al., Ultraviolet photoconductive sensor based on single ZnO nanowire, *physica status solidi (a)*, 207(2010) 1735-40.
- [70] M. Thepnurat, T. Chairuang Sri, N. Hong Sith, P. Ruankham, S. Choopun, Realization of Interlinked ZnO Tetrapod Networks for UV Sensor and Room-Temperature Gas Sensor, *ACS Applied Materials & Interfaces*, 7(2015) 24177-84.
- [71] C.A. Dorval Dion, J.R. Tavares, Photo-initiated chemical vapor deposition as a scalable particle functionalization technology (a practical review), *Powder Technology*, 239(2013) 484-91.
- [72] I. Stassen, M. Styles, G. Greci, H.V. Gorp, W. Vanderlinden, S.D. Feyter, et al., Chemical vapour deposition of zeolitic imidazolate framework thin films, *Nat Mater*, 15(2016) 304-10.
- [73] F. Maury, K. Gesheva, P. Hoffmann, G. Malandrino, D. Lundin, H. Pedersen, EUROCV D 19 Nineteenth European Conference on Chemical Vapor Deposition High Power Pulsed Plasma Enhanced Chemical Vapor Deposition: A Brief Overview of General Concepts and Early Results, *Physics Procedia*, 46(2013) 3-11.
- [74] K.K.S. Lau, J.A. Caulfield, K.K. Gleason, Structure and Morphology of Fluorocarbon Films Grown by Hot Filament Chemical Vapor Deposition, *Chemistry of Materials*, 12(2000) 3032-7.

- [75] C.P. Deck, K. Vecchio, Growth mechanism of vapor phase CVD-grown multi-walled carbon nanotubes, *Carbon*, 43(2005) 2608-17.
- [76] Y. Zuo, H. Qiu, X. Chen, J. He, Structural, electrical and photoluminescence properties of ZnO:Al network films grown on nanochannel Al₂O₃ substrates by direct current magnetron sputtering with an oblique target, *Materials Chemistry and Physics*, 133(2012) 507-14.
- [77] Y. Lei, X. Yan, N. Luo, Y. Song, Y. Zhang, ZnO nanotetrapod network as the adsorption layer for the improvement of glucose detection via multiterminal electron-exchange, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 361(2010) 169-73.
- [78] Z.J. Yan, D.W. Zeng, C.S. Xie, H.H. Wang, W.L. Song, Nanostructured ZnO network films deposited on Al₂O₃ substrates by chemical bath deposition, *Thin Solid Films*, 517(2009) 1541-5.
- [79] T. Wangenstein, T. Dhakal, M. Merlak, P. Mukherjee, M.H. Phan, S. Chandra, et al., Growth of uniform ZnO nanoparticles by a microwave plasma process, *Journal of Alloys and Compounds*, 509(2011) 6859-63.
- [80] J.H. Kim, Y.C. Hong, H.S. Uhm, Synthesis of oxide nanoparticles via microwave plasma decomposition of initial materials, *Surface and Coatings Technology*, 201(2007) 5114-20.
- [81] Y. Ni, S. Yang, J. Hong, P. Zhen, Y. Zhou, D. Chu, Microwave-assisted preparation, characterization and properties of columnar hexagonal-shaped ZnO microcrystals, *Scripta Materialia*, 59(2008) 127-30.
- [82] N.F. Hamedani, A.R. Mahjoub, A.A. Khodadadi, Y. Mortazavi, Microwave assisted fast synthesis of various ZnO morphologies for selective detection of CO, CH₄ and ethanol, *Sensors and Actuators B: Chemical*, 156(2011) 737-42.

- [83] D. Sharma, S. Sharma, B.S. Kaith, J. Rajput, M. Kaur, Synthesis of ZnO nanoparticles using surfactant free in-air and microwave method, *Applied Surface Science*, 257(2011) 9661-72.
- [84] H. Li, E.-t. Liu, F.Y.F. Chan, Z. Lu, R. Chen, Fabrication of ordered flower-like ZnO nanostructures by a microwave and ultrasonic combined technique and their enhanced photocatalytic activity, *Materials Letters*, 65(2011) 3440-3.
- [85] M.V. Limaye, S.B. Singh, R. Das, P. Poddar, S.K. Kulkarni, Room temperature ferromagnetism in undoped and Fe doped ZnO nanorods: Microwave-assisted synthesis, *Journal of Solid State Chemistry*, 184(2011) 391-400.
- [86] M. Thepnurat, P. Ruankham, S. Phadunghitidhada, A. Gardchareon, D. Wongratanaphisan, S. Choopun, Efficient charge-transport UV sensor based on interlinked ZnO tetrapod networks, *Surface and Coatings Technology*, (2015).
- [87] K.J. Rao, B. Vaidhyathan, M. Ganguli, P.A. Ramakrishnan, Synthesis of Inorganic Solids Using Microwaves, *Chemistry of Materials*, 11(1999) 882-95.
- [88] S. Choopun, N. Hongsith, E. Wongrat, Metal-Oxide Nanowires by Thermal Oxidation Reaction Technique 2010.
- [89] C.L. Wadhwa, *High voltage engineering*, Tunbridge Wells, UK: New Age Science; 2010.
- [90] E. Kuffel, W.S. Zaengl, J. Kuffel, Chapter 5 - Electrical breakdown in gases, in: E.K.S.Z. Kuffel (Ed.) *High Voltage Engineering Fundamentals* (Second edition), Newnes, Oxford, 2000, pp. 281-366.
- [91] Y. Li, C. Cheng, X. Dong, J. Gao, H. Zhang, Facile fabrication of UV photodetectors based on ZnO nanorod networks across trench electrodes, *Journal of Semiconductors*, 30(2009) 063004.

- [92] H. Ahn, Y. Wang, S. Hyun Jee, M. Park, Y.S. Yoon, D.-J. Kim, Enhanced UV activation of electrochemically doped Ni in ZnO nanorods for room temperature acetone sensing, *Chemical Physics Letters*, 511(2011) 331-5.
- [93] R. Vasita, D.S. Katti, Nanofibers and their applications in tissue engineering, *International Journal of Nanomedicine*, 1(2006) 15-30.
- [94] M. Imran, S. Haider, K. Ahmad, A. Mahmood, W.A. Al-masry, Fabrication and characterization of zinc oxide nanofibers for renewable energy applications, *Arabian Journal of Chemistry*, (2013).
- [95] Q. Qi, T. Zhang, L. Liu, X. Zheng, Q. Yu, Y. Zeng, et al., Selective acetone sensor based on dumbbell-like ZnO with rapid response and recovery, *Sensors and Actuators B: Chemical*, 134(2008) 166-70.
- [96] Q. Yu, C. Yu, H. Yang, W. Fu, L. Chang, J. Xu, et al., Growth of Dumbbell-like ZnO Microcrystals under Mild Conditions and their Photoluminescence Properties, *Inorganic Chemistry*, 46(2007) 6204-10.
- [97] Y. Gyu-Chul, W. Chunrui, P. Won Il, ZnO nanorods: synthesis, characterization and applications, *Semiconductor Science and Technology*, 20(2005) S22.
- [98] M.C. Newton, P.A. Warburton, ZnO tetrapod nanocrystals, *Materials Today*, 10(2007) 50-4.
- [99] S.-W. Fan, A.K. Srivastava, V.P. Dravid, Nanopatterned polycrystalline ZnO for room temperature gas sensing, *Sensors and Actuators B: Chemical*, 144(2010) 159-63.
- [100] J. E. Ayers, *Heteroepitaxy of Semiconductors*, CRC Press, Boca Raton, FL, 2007.
- [101] L. Yang, *Lattice mismatched compound semiconductors and devices on silicon*, Massachusetts Institute of Technology, 2011.

[102] D. Shaoa, H. Sunb, G. Xinb, J. Lianb, S. Sawyer, High quality ZnO–TiO₂core–shell nanowires forefficient ultraviolet sensing, Applied Surface Science 314 (2014) 872–876



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