References

Ahn, C. H., Kim, Y. Y., Kim, D. C., Mohanta, S. K. and Cho, H. K., A comparative analysis of deep level emission in ZnO layers deposited by various methods,*J. Appl. Phys.*, 105, 013502-013502-5, 2009.

Aizawa, H., Katsumata, T., Takahashi, J., Matsunaga, K., Komuro, S., Morikawa, T. and Toba, E., Long afterglow phosphorescent sensor materials for fiber-optic thermometer,*Rev. Sci. Instrum.*, 74, 1344-1349, 2003.

Akhavan, O. and Ghaderi, E., Toxicity of graphene and graphene oxide nanowalls against bacteria,*ACS Nano*, 4, 5731-5736, 2010.

Alaria, J., Bieber, H., Colis, S., Schmerber, G. and Dinia, A., Absence of ferromagnetism in Al-doped $Zn_{0.9}Co_{0.10}O$ diluted magnetic semiconductors,*Appl. Phys. Lett.*, 88, 112503-112503-3, 2006.

Albrecht, J. D., Ruden, P. P., Limpijumnong, S., Lambrecht, W. R. L. and Brennan, K. F., High field electron transport properties of bulk ZnO,*J. Appl. Phys.*, 86, 6864-6867, 1999.

Al-Hilli, S. M., Al-Mofarji, R. T. and Willander, M., Zinc oxide nanorod for intracellular pH sensing,*Appl. Phys. Lett.*, 89, 173119, 2006.

Al-Hilli,S., Willander,M. M., Öst, A. and Strålfors, P.,ZnO nanorods as an intracellular sensor for *p*H measurements,*J. Appl. Phys.*102, 084304 2007.

Alivov, Y. I., Johnstone, D., Özgür, Ü., Avrutin, V., Fan, Q., Akarca-Biyikli, S. S. and Morkoç, H., Electrical and optical properties of n-ZnO/p-SiC heterojunctions,*Jpn. J. Appl. Phys.*, 44, 7281, 2005a.

Alivov, Y. I., Kalinina, E. V., Cherenkov, A. E., Look, D. C., Ataev, B. M., Omaev, A. K., Chukichev, M. V. and Bagnall, D. M., Fabrication and characterization of n-ZnO/p-AlGaN heterojunction light-emitting diodes on 6H-SiC substrates,*Appl. Phys. Lett.*, 83, 4719-4721, 2003.

Alivov, Y. I., Ozgur, U., Dogan, S., Johnstone, D., Avrutin, V., Onojima, N., Liu, C., Xie, J., Fan, Q. and Morkoc, H., Photoresponse of n-ZnO/p-SiC heterojunction diodes grown by plasma-assisted molecular-beam epitaxy,*Appl. Phys. Lett.*, 86, 241108-241108-3, 2005b.

Alvi, N. H., ul Hassan, W., Farooq, B., Nur, O. and Willander, M., Influence of different growth environments on the luminescence properties of ZnO nanorods grown by the vapor-liquid-solid (VLS) method,*Mater. Lett.*, 106, 158-163, 2013.

Ando, K., Saito, H., Jin, Z., Fukumura, T., Kawasaki, M., Matsumoto, Y. and Koinuma, H., Large magneto-optical effect in an oxide diluted magnetic semiconductor $Zn_{1-x}Co_xO$,*Appl. Phys. Lett.*, 78, 2700-2702, 2001.

Anwand, W., Brauer, G., Cowan, T. E., Grambole, D., Skorupa, W., Čížek, J., Kuriplach, J., Procházka, I., Egger, W. and Sperr, P., Structural characterization of H plasma-doped ZnO single crystals by positron annihilation spectroscopies,*Phys. Status Solidi A*, 207, 2415-2425, 2010.

Aranovich, J. A., Golmayo, D., Fahrenbruch, A. L. and Bube, R. H., Photovoltaic properties of ZnO/CdTe heterojunctions prepared by spray pyrolysis,*J. Appl. Phys.*, 51, 4260-4268, 1980.

Arnold, M. S., Avouris, P., Pan, Z. W. and Wang, Z. L., Field-effect transistors based on single semiconducting oxide nanobelts,*J. Phys. Chem. B*, 107, 659-663, 2003.

Ates, E. S. and Unalan, H. E., Zinc oxide nanowire enhanced multifunctional coatings for cotton fabrics,*Thin Solid Films*, 520, 4658-4661, 2012.

Atienzar, P., Ishwara, T., Illy, B. N., Ryan, M. P., O'Regan, B. C., Durrant, J. R. and Nelson, J., Control of photocurrent generation in polymer/ZnO nanorod solar cells by using a solution-processed TiO_2 overlayer,*J. Phys. Chem. Lett.*, 1, 708–713, 2010.

Audebrand, N., Auffrédic, J.-P.and Louër, D., X-ray diffraction study of the early stages of the growth of nanoscale zinc oxide crystallites obtained from thermal decomposition of four precursors. General concepts on precursor-dependent microstructural properties,*Chem. Mater.*, 10, 2450-2461, 1998.

Avdeev, M., Yakovlev, S., Yaremchenko, A. A. and Kharton, V. V., Transitions between P2 1, and P6 3 22 modifications of $SrAl_2O_4$ by in situ high-temperature X-ray and neutron diffraction,*J. Solid State Chem.*, 180, 3535-3544, 2007.

Avrutin, V., Silversmith, D. J. and Morkoc, H., Doping asymmetry problem in ZnO: current status and outlook,*Proc. IEEE*, 98, 1269-1280, 2010.

Bach, U., Lupo, D., Comte, P., Moser, J. E., Weissörtel, F., Salbeck, J., Spreitzer, H. and Grätzel, M., Solid-state dye-sensitized mesoporous TiO_2 solar cells with high photon-to-electron conversion efficiencies,*Nature*, 395, 583-585, 1998.

Bahadur, N. M., Furusawa, T., Sato, M., Kurayama, F. and Suzuki, N., Rapid synthesis, characterization and optical properties of TiO_2 coated ZnO

nanocomposite particles by a novel microwave irradiation method,*Mater. Res. Bull.*, 45, 1383-1388, 2010.

Banerjee, S., Mandal, M., Gayathri, N. and Sardar, M., Enhancement of ferromagnetism upon thermal annealing in pure ZnO,*Appl. Phys. Lett.*, 91, 182501-182501-3, 2007.

Barbier, J. and Fleet, M. E., Investigation of phase relations in the (Na, K) $AlGeO_4$ system,*Phys. Chem. Miner.*, 16, 276-285, 1988.

Barick, K. C., Aslam, M., Dravid, V. P. and Bahadur, D., Controlled fabrication of oriented co-doped ZnO clustered nanoassemblies,*J. Colloid Interface Sci.*, 349, 19-26, 2010.

Baruah, S., Thanachayanont, C. and Dutta, J., Growth of ZnO nanowires on nonwoven polyethylene fibers,*Sci. Technol. Adv. Mater.*, 9, 025009, 2008.

Batista, P. D. and Mulato, M., ZnO extended-gate field-effect transistors as pH sensors,*Appl. Phys. Lett.*, 87, 143508-143508-3, 2005.

Behan, A. J., Mokhtari, A., Blythe, H. J., Score, D., Xu, X. H., Neal, J. R., Fox, A. M. and Gehring, G. A., Two magnetic regimes in doped ZnO corresponding to a dilute magnetic semiconductor and a dilute magnetic insulator,*Phys. Rev. Lett.*, 100, 047206, 2008.

Benhebal, H., Chaib, M., Salmon, T., Geens, J., Léonard, A., Lambert, S. D., Crine, M. and Heinrichs, B., Photocatalytic degradation of phenol and benzoic acid using zinc oxide powders prepared by the sol-gel process,*Alex. Eng. J.*, 52, 517-523, 2013.

Bhaduri, S., Bhaduri, S. B. and Prisbrey, K. A., Auto ignition synthesis of nanocrystalline $MgAl_2O_4$ and related nanocomposites,*J. Mater.Res.*, 14, 3571-3580, 1999.

Bhaduri, S., Bhaduri, S. B. and Zhou, E., Auto ignition synthesis and consolidation of Al_2O_3-ZrO_2 nano/nano composite powders,*J. Mater.Res.*, 13, 156-165, 1998.

Bher, G. and Fliegel, W., Electrical properties and improvement of the gas sensitivity in multiple-doped SnO_2,*Sens. Actuators B Chem.*, 26, 33-37, 1995.

Bos, A. J. J., Theory of thermoluminescence,*Radiat. Meas.*, 41, S45-S56, 2006.

Brauer, G., Anwand, W., Grambole, D., Grenzer, J., Skorupa, W., Čížek, J., Kuriplach, J., Procházka, I., Ling, C. C. and So, C. K., Identification of Zn-

vacancy-hydrogen complexes in ZnO single crystals: A challenge to positron annihilation spectroscopy,*Phys. Rev. B*, 79, 115212, 2009.

Brauer, G., Anwand, W., Skorupa, W., Kuriplach, J., Melikhova, O., Moisson, C., Von Wenckstern, H., Schmidt, H., Lorenz, M. and Grundmann, M., Defects in virgin and N^+-implanted ZnO single crystals studied by positron annihilation, Hall effect, and deep-level transient spectroscopy,*Phys. Rev. B*, 74, 045208, 2006.

Brauer, G., Kuriplach, J., Cizek, J., Anwand, W., Melikhova, O., Prochazka, I. and Skorupa, W., Positron lifetimes in ZnO single crystals,*Vacuum*, 81, 1314-1317, 2007.

Budd, K. D., *Zinc sulfide*, Google Patents,1995.

Bundesmann, C., Ashkenov, N., Schubert, M., Spemann, D., Butz, T., Kaidashev, E. M., Lorenz, M. and Grundmann, M., Raman scattering in ZnO thin films doped with Fe, Sb, Al, Ga, and Li,*Appl. Phys. Lett.*, 83, 1974-1976, 2003.

Bylander, E. G., Surface effects on the low-energy cathodoluminescence of zinc oxide,*J. Appl. Phys.*, 49, 1188-1195, 1978.

Cannas, C., Casu, M., Lai, A., Musinu, A. and Piccaluga, G., XRD, TEM and 29Si MAS NMR study of sol-gel ZnO-SiO_2 nanocomposites,*J Mater Chem*, 9, 1765-1769, 1999.

Capron, M. and Douy, A., Strontium dialuminate $SrAl_4O_7$: synthesis and stability,*J. Am. Ceram. Soc.*, 85, 3036-3040, 2002.

Catti, M., Noel, Y. and Dovesi, R., Full piezoelectric tensors of wurtzite and zinc blende ZnO and ZnS by first-principles calculations,*J. Phys. Chem. Solids*, 64, 2183-2190, 2003.

Chakraborti, D., Ramachandran, S., Trichy, G., Narayan, J. and Prater, J. T., Magnetic, electrical, and microstructural characterization of ZnO thin films codoped with Co and Cu,*J. Appl. Phys.*, 101, 053918, 2007.

Chang, P.-C., Fan, Z., Wang, D., Tseng, W.-Y., Chiou, W.-A., Hong, J. and Lu, J. G., ZnO nanowires synthesized by vapor trapping CVD method,*Chem. Mater.*, 16, 5133-5137, 2004.

Chang, T. G. and Irish, D. E., Raman and infrared spectra study of magnesium nitrate-water systems,*J. Phys. Chem.*, 77, 52-57, 1973.

Chen, J., Deng, H. and Wei, M., Hydrothermal synthesis and optical properties of ZnO single-crystal hexagonal microtubes,*Mater.Sci. Eng. B*, 163, 157-160, 2009.

Chen, J., Feng, Z., Ying, P., Li, M., Han, B. and Li, C., The visible luminescent characteristics of ZnO supported on SiO_2 powder,*Phys. Chem. Chem. Phys.*, 6, 4473-4479, 2004.

Chen, L.-T., Hwang, C.-S., Chen, I.-G.and Chang, S.-J., Chromaticity of inhomogeneous broadening effect on $Ca_xSr_{1-x}Al_2O_4:Eu^{2+}$phosphors,*J. Alloys Compd.*, 426, 395-399, 2006.

Chen, Z. Q., Maekawa, M., Yamamoto, S., Kawasuso, A., Yuan, X. L., Sekiguchi, T., Suzuki, R. and Ohdaira, T., Evolution of voids in Al^+-implanted ZnO probed by a slow positron beam,*Phys. Rev. B*, 69, 035210, 2004.

Cheng, X. L., Zhao, H., Huo, L. H., Gao, S. and Zhao, J. G., ZnO nanoparticulate thin film: preparation, characterization and gas-sensing property,*Sens. Actuators B Chem.*, 102, 248-252, 2004.

Chik, H., Liang, J., Cloutier, S. G., Kouklin, N. and Xu, J. M., Periodic array of uniform ZnO nanorods by second-order self-assembly,*Appl. Phys. Lett.*, 84, 3376-3378, 2004.

Chung, J., Myoung, J., Oh, J. and Lim, S., Synthesis of a ZnS shell on the ZnO nanowire and its effect on the nanowire-based dye-sensitized solar cells,*J. Phys. Chem. C*, 114, 21360-21365, 2010.

Čížek, J., Žaludová, N., Vlach, M., Daniš, S., Kuriplach, J., Procházka, I., Brauer, G., Anwand, W., Grambole, D. and Skorupa, W., Defect studies of ZnO single crystals electrochemically doped with hydrogen,*J. Appl. Phys.*, 103, 053508, 2008.

Coey, J. M. D., Venkatesan, M. and Fitzgerald, C. B., Donor impurity band exchange in dilute ferromagnetic oxides,*Nat. Mater.*, 4, 173-179, 2005.

Coskun, C., Look, D. C., Farlow, G. C. and Sizelove, J. R., Radiation hardness of ZnO at low temperatures,*Semicond. Sci. Technol.*, 19, 752, 2004.

Cox, S. F. J., Davis, E. A., Cottrell, S. P., King, P. J. C., Lord, J. S., Gil, J. M., Alberto, H. V., Vilao, R. C., Duarte, J. P. and de Campos, N. A., Experimental confirmation of the predicted shallow donor hydrogen state in zinc oxide,*Phys. Rev. Lett.*, 86, 2601, 2001.

Cross, S.E., Innes, B., Roberts, M.S., Tsuzuki, T., Robertson, T.A., McCormick, P., Human skin penetration of sunscreen nanoparticles: *In vitro* assessment of novel micronized zinc oxide formulation. *Skin Pharmacol.*, *20*, 148, 2007.

Cui, J. and Gibson, U., Thermal modification of magnetism in cobalt-doped ZnO nanowires grown at low temperatures,*Phys. Rev. B*, 74, 045416, 2006.

Cuscó, R., Alarcón-Lladó, E., Ibanez, J., Artús, L., Jiménez, J., Wang, B. and Callahan, M. J., Temperature dependence of Raman scattering in ZnO,*Phys. Rev. B*, 75, 165202, 2007.

Cuscó, R., Artús, L., Pastor, D., Naranjo, F. B. and Calleja, E., Local vibrational modes of H complexes in Mg-doped GaN grown by molecular beam epitaxy,*Appl. Phys. Lett.*, 84, 897-899, 2004.

Dal Corso, A., Posternak, M., Resta, R. and Baldereschi, A., Ab initio study of piezoelectricity and spontaneous polarization in ZnO,*Phys. Rev. B*, 50, 10715, 1994.

Das, A., Wang, D.-Y., Leuteritz, A., Subramaniam, K., Greenwell, H. C., Wagenknecht, U. and Heinrich, G., Preparation of zinc oxide free, transparent rubber nanocomposites using a layered double hydroxide filler,*J. Mater. Chem.*, 21, 7194-7200, 2011.

Das, S. and Ghosh, S., Fabrication of different morphologies of ZnO superstructures in presence of synthesized ethylammonium nitrate (EAN) ionic liquid: synthesis, characterization and analysis,*Dalton Trans.*, 42, 1645-1656, 2013.

Das, S., Chakrabarti, S. and Chaudhuri, S., Optical transmission and photoluminescence studies of ZnO? MgO nanocomposite thin films,*J. Phys. Appl. Phys.*, 38, 4021, 2005.

Decremps, F., Pellicer-Porres, J., Saitta, A. M., Chervin, J.-C.and Polian, A., High-pressure Raman spectroscopy study of wurtzite ZnO,*Phys. Rev. B*, 65, 092101, 2002.

Degen, A. and Kosec, M., Effect of pH and impurities on the surface charge of zinc oxide in aqueous solution,*J. Eur. Ceram. Soc.*, 20, 667-673, 2000.

Dehuff, N. L., Kettenring, E. S., Hong, D., Chiang, H. Q., Wager, J. F., Hoffman, R. L., Park, C.-H. and Keszler, D. A., Transparent thin-film transistors with zinc indium oxide channel layer,*J. Appl. Phys.*, 97, 064505, 2005.

Dev, A., Panda, S. K., Kar, S., Chakrabarti, S. and Chaudhuri, S., Surfactant-assisted route to synthesize well-aligned ZnO nanorod arrays on sol-gel-derived ZnO thin films,*J. Phys. Chem. B*, 110, 14266-14272, 2006.

Didosyan, Y. S., Hauser, H., Reider, G. A. and Toriser, W., Fast latching type optical switch,*J. Appl. Phys.*, 95, 7339-7341, 2004.

Djurišić, A. B., Leung, Y. H., Choy, W. C., Cheah, K. W. and Chan, W. K., Visible photoluminescence in ZnO tetrapod and multipod structures,*Appl. Phys. Lett.*, 84, 2635-2637, 2004.

Dong-Dong, J., Bo-Qun, W. and Jing, Z., Phase dependence of luminescent emission of Eu^{2+} doped $SrAl_2O_4$,*Chin. Phys.*, 9, 69, 2000.

Douy, A. and Capron, M., Crystallisation of spray-dried amorphous precursors in the SrO-Al_2O_3system: a DSC study,*J. Eur. Ceram. Soc.*, 23, 2075-2081, 2003.

Drapak, I.T. Semiconductors, 2, 624,1968.

Duan, L. B., Zhao, X. R., Liu, J. M., Wang, T. and Rao, G. H., Room-temperature ferromagnetism in lightly Cr-doped ZnO nanoparticles,*Appl. Phys.A*, 99, 679-683, 2010.

Duan, X., Huang, Y., Cui, Y., Wang, J. and Lieber, C. M., Indium phosphide nanowires as building blocks for nanoscale electronic and optoelectronic devices,*Nature*, 409, 66-69, 2001.

Duan, X., Wang, X., Yu, F. and Yuan, D., Effects of annealing temperature and SiO_2 matrix on the structure and optical properties of Co-doped $ZnAl_2O_4/SiO_2$ nanoglass–ceramic composites,*J. Phys. Chem. C*, 116, 2313-2321, 2012.

Duan, X., Yuan, D. and Yu, F., Cation distribution in Co-doped $ZnAl_2O_4$ nanoparticles studied by X-ray photoelectron spectroscopy and ^{27}Al solid-state NMR spectroscopy,*Inorg. Chem.*, 50, 5460-5467, 2011.

Dulub, O., Meyer, B. and Diebold, U., Observation of the dynamical change in a water monolayer adsorbed on a ZnO surface,*Phys. Rev. Lett.*, 95, 136101, 2005.

Dutta, S., Chakrabarti, M., Chattopadhyay, S., Jana, D., Sanyal, D. and Sarkar, A., Defect dynamics in annealed ZnO by positron annihilation spectroscopy,*J. Appl. Phys.*, 98, 053513, 2005.

Dutta, S., Chattopadhyay, S., Sarkar, A., Chakrabarti, M., Sanyal, D. and Jana, D., Role of defects in tailoring structural, electrical and optical properties of ZnO,*Prog.Mater.Sci.*, 54, 89-136, 2009.

Elder, S. H., Cot, F. M., Su, Y., Heald, S. M., Tyryshkin, A. M., Bowman, M. K., Gao, Y., Joly, A. G., Balmer, M. L. and Kolwaite, A. C., The discovery and study of nanocrystalline TiO_2-(MoO_3) core-shell materials,*J. Am. Chem. Soc.*, 122, 5138-5146, 2000.

Emanetoglu, N. W., Zhu, J., Chen, Y., Zhong, J., Chen, Y. and Lu, Y., Surface acoustic wave ultraviolet photodetectors using epitaxial ZnO multilayers grown on r-plane sapphire,*Appl. Phys. Lett.*, 85, 3702-3704, 2004.

Emen, F. M. and Külcü, N., Synthesis, characterization and luminescence properties of long afterglow Phosphor $Ba_4Al_{14}O_{25}$: Eu, Dy,*Eur. J. Chem.*, 1, 28-32, 2010.

Escribano, P., Marchal, M., Luisa Sanjuán, M., Alonso-Gutiérrez, P., Julián, B. and Cordoncillo, E., Low-temperature synthesis of $SrAl_2O_4$by a modified sol-gel route: XRD and Raman characterization,*J. Solid State Chem.*, 178, 1978-1987, 2005.

Etacheri, V., Roshan, R. and Kumar, V., Mg-doped ZnO nanoparticles for efficient sunlight-driven photocatalysis,*ACS Appl. Mater.Interfaces*, 4, 2717-2725, 2012.

Fan, H. J., Scholz, R., Kolb, F. M., Zacharias, M. and Gösele, U., Growth mechanism and characterization of zinc oxide microcages,*Solid State Commun.*, 130, 517-521, 2004.

Fan, H., Zhao, X., Yang, J., Shan, X., Yang, L., Zhang, Y., Li, X. and Gao, M., ZnO-graphene composite for photocatalytic degradation of methylene blue dye,*Catal. Commun.*, 29, 29-34, 2012.

Fan, J. and Freer, R., The roles played by Ag and Al dopants in controlling the electrical properties of ZnO varistors,*J. Appl. Phys.*, 77, 4795-4800, 1995.

Fan, Z. and Lu, J. G., Zinc oxide nanostructures: synthesis and properties,*J. Nanosci. Nanotechnol.*, 5, 1561-1573, 2005.

Fukuda, K. and Fukushima, K., Crystal structure of hexagonal $SrAl_2O_4$at 1073K,*J. Solid State Chem.*, 178, 2709-2714, 2005.

Fukumura, T., Jin, Z., Ohtomo, A., Koinuma, H. and Kawasaki, M., An oxide-diluted magnetic semiconductor: Mn-doped ZnO,*Appl. Phys. Lett.*, 75, 3366-3368, 1999.

Gao, P. X. and Wang, Z. L., Substrate atomic-termination-induced anisotropic growth of ZnO nanowires/nanorods by the VLS process,*J. Phys. Chem. B*, 108, 7534-7537, 2004.

Gao, Q., Wen, J., Liu, X., Wu, L., Gao, H. and Zhang, X., Routes to Probe Strain in "ZnO/ZnS Superlattice" Nanostructures by X-ray Diffraction,*J. Phys. Chem. C*, 117, 14247-14253, 2013.

Gao, Q., Zhu, Q., Guo, Y. and Yang, C. Q., Formation of highly hydrophobic surfaces on cotton and polyester fabrics using silica sol nanoparticles and nonfluorinated alkylsilane,*Ind. Eng. Chem. Res.*, 48, 9797-9803, 2009.

Gardeniers, J. G. E., Rittersma, Z. M. and Burger, G. J., Preferred orientation and piezoelectricity in sputtered ZnO films,*J. Appl. Phys.*, 83, 7844-7854, 1998.

Garzella, C., Comini, E., Tempesti, E., Frigeri, C. and Sberveglieri, G., TiO_2 thin films by a novel sol-gel processing for gas sensor applications,*Sens. Actuators B Chem.*, 68, 189-196, 2000.

Gayen, R. N., Das, S. N., Dalui, S., Bhar, R. and Pal, A. K., Zinc magnesium oxide nanofibers on glass substrate by solution growth technique,*J. Cryst. Growth*, 310, 4073-4080, 2008.

Gesing, T. M., Schowalter, M., Weidenthaler, C., Murshed, M. M., Nénert, G., Mendive, C. B., Curti, M., Rosenauer, A., Buhl, J.-C.and Schneider, H., Strontium doping in mullite-type bismuth aluminate: a vacancy investigation using neutrons, photons and electrons,*J. Mater. Chem.*, 22, 18814-18823, 2012.

Ghosh, P. and Patra, A., Influence of surface coating on physical properties of TiO_2/Eu^{3+} nanocrystals,*J. Phys. Chem. C*, 111, 7004-7010, 2007.

Gomez, J. L. and Tigli, O., Zinc oxide nanostructures: from growth to application,*J. Mater. Sci.*, 48, 612-624, 2013.

González, R., Chen, Y. and Mostoller, M., Substitutional H--ion vibrations in the alkaline-earth oxides reduced at high temperatures,*Phys. Rev. B*, 24, 6862, 1981.

Götz, W., Johnson, N. M., Bour, D. P., McCluskey, M. and Haller, E. E., Local vibrational modes of the Mg-H acceptor complex in GaN,*Appl. Phys. Lett.*, 69, 3725-3727, 1996.

Govender, K., Boyle, D. S., Kenway, P. B. and O'Brien, P., Understanding the factors that govern the deposition and morphology of thin films of ZnO from aqueous solution,*J. Mater. Chem.*, 14, 2575-2591, 2004.

Green, A. N., Palomares, E., Haque, S. A., Kroon, J. M. and Durrant, J. R., Charge transport versus recombination in dye-sensitized solar cells employing nanocrystalline TiO_2 and SnO_2 films,*J. Phys. Chem. B*, 109, 12525-12533, 2005.

Gritsyna, V. T., Kazarinov, Y. G., Kobyakov, V. A. and Sickafus, K. E., Defects and radiation induced electronic processes in magnesium aluminate spinel of different compositions,*Radiat. Eff. Defects Solids*, 157, 659-663, 2002.

Gu, F., Wang, S. F., Lü, M. K., Zhou, G. J., Xu, D. and Yuan, D. R., Photoluminescence properties of SnO2 nanoparticles synthesized by sol-gel method,*J. Phys. Chem. B*, 108, 8119-8123, 2004.

Gu, Z., Liu, F., Li, X. and Pan, Z. W., Luminescent GeO_2-Zn_2GeO_4 hybrid one dimensional nanostructures,*CrystEngComm*, 15, 2904-2908, 2013.

Guo, L., Ji, Y. L., Xu, H., Simon, P. and Wu, Z., Regularly shaped, single-crystalline ZnO nanorods with wurtzite structure,*J. Am. Chem. Soc.*, 124, 14864-14865, 2002.

Hadjiev, V. G., Iliev, M. N. and Vergilov, I. V., The Raman spectra of Co_3O_4,*J. Phys. C Solid State Phys.*, 21, L199, 1988.

Han, X.-G., He, H.-Z., Kuang, Q., Zhou, X., Zhang, X.-H., Xu, T., Xie, Z.-X. and Zheng, L.-S., Controlling morphologies and tuning the related properties of nano/microstructured ZnO crystallites,*J. Phys. Chem. C*, 113, 584-589, 2008.

Hariharan, C., Photocatalytic degradation of organic contaminants in water by ZnO nanoparticles: Revisited,*Appl. Catal. Gen.*, 304, 55-61, 2006.

He, Y., Sharma, P., Biswas, K., Liu, E. Z., Ohtsu, N., Inoue, A., Inada, Y., Nomura, M., Tse, J. S. and Yin, S., Origin of ferromagnetism in ZnO codoped with Ga and Co: Experiment and theory,*Phys. Rev. B*, 78, 155202, 2008.

Henderson, C. M. B. and Taylor, D., The structural behaviour of the nepheline family:(1) Sr and Ba aluminates (MAl_2O_4),*Mineral. Mag.*, 45, 111-127, 1982.

Heo, Y. W., Tien, L. C., Norton, D. P., Kang, B. S., Ren, F., Gila, B. P. and Pearton, S. J., Electrical transport properties of single ZnO nanorods,*Appl. Phys. Lett.*, 85, 2002-2004, 2004.

Herng, T. S., Lau, S. P., Yu, S. F., Yang, H. Y., Ji, X. H., Chen, J. S., Yasui, N. and Inaba, H., Origin of room temperature ferromagnetism in ZnO: Cu films,*J. Appl. Phys.*, 99, 086101-086101-3, 2006.

Hofmann, D. M., Hofstaetter, A., Leiter, F., Zhou, H., Henecker, F., Meyer, B. K., Orlinskii, S. B., Schmidt, J. and Baranov, P. G., Hydrogen: a relevant shallow donor in zinc oxide,*Phys. Rev. Lett.*, 88, 045504, 2002.

Hossain, M. K., Ghosh, S. C., Boontongkong, Y., Thanachayanont, C. and Dutta, J., Growth of zinc oxide nanowires and nanobelts for gas sensing applications,*Journal of Metastable and Nanocrystalline Materials*, Trans Tech Publ, 2005.

Hotchandani, S. and Kamat, P. V., Charge-transfer processes in coupled semiconductor systems.Photochemistry and photoelectrochemistry of the colloidal cadmium sulfide-zinc oxide system,*J. Phys. Chem.*, 96, 6834-6839, 1992.

Hou, Q., Meng, F. and Sun, J., Electrical and optical properties of Al-doped ZnO and $ZnAl_2O_4$ films prepared by atomic layer deposition,*Nanoscale Res. Lett.*, 8, 1-8, 2013.

Hsu, H. S., Huang, J.-C. A., Chen, S. F. and Liu, C. P., Role of grain boundary and grain defects on ferromagnetism in Co: ZnO films,*Appl. Phys. Lett.*, 90, 102506-102506-3, 2007.

Hsu, H. S., Huang, J.-C. A., Huang, Y. H., Liao, Y. F., Lin, M. Z., Lee, C. H., Lee, J. F., Chen, S. F., Lai, L. Y. and Liu, C.-P., Evidence of oxygen vacancy enhanced room-temperature ferromagnetism in Co-doped ZnO,*Appl. Phys. Lett.*, 88, 242507-242507-3, 2006.

Huang, M. H., Mao, S., Feick, H., Yan, H., Wu, Y., Kind, H., Weber, E., Russo, R. and Yang, P., Room-temperature ultraviolet nanowire nanolasers,*science*, 292, 1897-1899, 2001a.

Huang, M. H., Wu, Y., Feick, H., Tran, N., Weber, E. and Yang, P., Catalytic growth of zinc oxide nanowires by vapor transport,*Adv. Mater.*, 13, 113-116, 2001b.

Hutson, A. R., Piezoelectricity and conductivity in ZnO and CdS,*Phys. Rev. Lett.*, 4, 505, 1960.

Hwang, D.-K., Oh, M.-S., Lim, J.-H., Choi, Y.-S.and Park, S.-J., ZnO-based light-emitting metal-insulator-semiconductor diodes,*Appl. Phys. Lett.*, 91, 121113-121113-3, 2007.

Ilyas, U., Rawat, R. S., Tan, T. L., Lee, P., Chen, R., Sun, H. D., Fengji, L. and Zhang, S., Oxygen rich p-type ZnO thin films using wet chemical route with enhanced carrier concentration by temperature-dependent tuning of acceptor defects,*J. Appl. Phys.*, 110, 093522, 2011.

Inamdar, D. Y., Pathak, A. K., Dubenko, I., Ali, N. and Mahamuni, S., Room temperature ferromagnetism and photoluminescence of Fe doped ZnO nanocrystals,*J. Phys. Chem. C*, 115, 23671-23676, 2011.

Ip, K., Overberg, M. E., Heo, Y. W., Norton, D. P., Pearton, S. J., Stutz, C. E., Luo, B., Ren, F., Look, D. C. and Zavada, J. M., Hydrogen incorporation and diffusivity in plasma-exposed bulk ZnO,*Appl. Phys. Lett.*, 82, 385-387, 2003.

Ippolito, S. J., Kandasamy, S., Kalantar-Zadeh, K., Wlodarski, W., Galatsis, K., Kiriakidis, G., Katsarakis, N. and Suchea, M., Highly sensitive layered ZnO/$LiNbO_3$ SAW device with InO_x selective layer for $NO_2$and H_2gas sensing,*Sens. Actuators B Chem.*, 111, 207-212, 2005.

Ishizuka, S., Suzuki, K., Okamoto, Y., Yanagita, M., Sakurai, T., Akimoto, K., Fujiwara, N., Kobayashi, H., Matsubara, K. and Niki, S., Polycrystalline n-ZnO/p-Cu_2O heterojunctions grown by RF-magnetron sputtering,*Phys. Status Solidi C*, 1, 1067-1070, 2004.

Itoh, T. and Suga, T., Force sensing microcantilever using sputtered zinc oxide thin film,*Appl. Phys. Lett.*, 64, 37-39, 1994.

Jagadish, C. and Pearton, S. J., *Zinc oxide bulk, thin films and nanostructures: processing, properties, and applications*, Elsevier, 2011.

Jang, D. M., Kwak, I. H., Kwon, E. L., Jung, C. S., Im, H. S., Park, K. and Park, J., Transition-Metal Doping of Oxide Nanocrystals for Enhanced Catalytic Oxygen Evolution,*J. Phys. Chem. C*, 2015.

Janitabar-Darzi, S. and Mahjoub, A. R., Investigation of phase transformations and photocatalytic properties of sol-gel prepared nanostructured ZnO/TiO_2 composites,*J. Alloys Compd.*, 486, 805-808, 2009.

Janotti, A. and Van de Walle, C. G., Fundamentals of zinc oxide as a semiconductor,*Rep. Prog. Phys.*, 72, 126501, 2009.

Jayakumar, O. D., Gopalakrishnan, I. K. and Kulshreshtha, S. K., The structural and magnetization studies of Co-doped ZnO co-doped with Cu: Synthesized by co-precipitation method,*J. Mater. Chem.*, 15, 3514-3518, 2005.

Jeong, I.-S., Kim, J. H. and Im, S., Ultraviolet-enhanced photodiode employing n-ZnO/p-Si structure,*Appl. Phys. Lett.*, 83, 2946-2948, 2003.

Jia, W., Dang, S., Liu, H., Zhang, Z., Yu, C., Liu, X. and Xu, B., Evidence of the formation mechanism of ZnO in aqueous solution,*Mater.Lett.*, 82, 99-101, 2012.

Jia, W., Yuan, H., Lu, L., Liu, H. and Yen, W. M., Phosphorescent dynamics in $SrAl_2O_4$: Eu^{2+}, Dy^{3+} single crystal fibers,*J. Lumin.*, 76, 424-428, 1998.

Jian, W. B., Wu, Z. Y., Huang, R. T., Chen, F. R., Kai, J. J., Wu, C. Y., Chiang, S. J., Lan, M. D. and Lin, J. J., Direct observation of structure effect on ferromagnetism in $Zn_{1-x}Co_xO$ nanowires,*Phys. Rev. B*, 73, 233308, 2006.

Jiang, P., Zhou, J.-J., Fang, H.-F., Wang, C.-Y., Wang, Z. L. and Xie, S.-S., Hierarchical shelled ZnO structures made of bunched nanowire arrays,*Adv. Funct. Mater.*, 17, 1303-1310, 2007.

Jiansheng, J., Wang, G. Wang, Q., Chen, Y., Han, X., Wang, X., Hou, J. G., *J. Phys. Chem. B,* 108, 11976, 2004.

Jie, J., Wang, G., Wang, Q., Chen, Y., Han, X., Wang, X. and Hou, J. G., Synthesis and characterization of aligned ZnO nanorods on porous aluminum oxide template,*J. Phys. Chem. B*, 108, 11976-11980, 2004.

Jin, Z., Fukumura, T., Kawasaki, M., Ando, K., Saito, H., Sekiguchi, T., Yoo, Y. Z., Murakami, M., Matsumoto, Y. and Hasegawa, T., High throughput fabrication of transition-metal-doped epitaxial ZnO thin films: A series of oxide-diluted magnetic semiconductors and their properties,*Appl. Phys. Lett.*, 78, 3824-3826, 2001.

Jo, S. H., Banerjee, D. and Ren, Z. F., Field emission of zinc oxide nanowires grown on carbon cloth,*Appl. Phys. Lett.*, 85, 1407-1409, 2004.

Johnson, J. C., Yan, H., Yang, P. and Saykally, R. J., Optical cavity effects in ZnO nanowire lasers and waveguides,*J. Phys. Chem. B*, 107, 8816-8828, 2003.

Joo, J. H., Greenberg, K. J., Baram, M., Clarke, D. R. and Hu, E. L., Aqueous Epitaxial Growth of ZnO on Single Crystalline Au Microplates,*Cryst. Growth Des.*, 13, 986-991, 2013.

Joseph, D. P. and Venkateswaran, C., Bandgap engineering in ZnO by doping with 3d transition metal ions,*J. At.Mol. Opt. Phys.*, 2011, 2011.

Jung, K. Y., Lee, H. W. and Jung, H.-K., Luminescent properties of (Sr, Zn) Al_2O_4: Eu^{2+}, B^{3+} particles as a potential green phosphor for UV LEDs,*Chem. Mater.*, 18, 2249-2255, 2006.

Kang, B. S., Ren, F., Heo, Y. W., Tien, L. C., Norton, D. P. and Pearton, S. J., pH measurements with single ZnO nanorods integrated with a microchannel,*Appl. Phys. Lett.*, 86, 112105, 2005.

Kao, H.-C.and Wei, W.-C., Kinetics and microstructural evolution of heterogeneous transformation of θ-Alumina to α-Alumina, *J. Am. Ceram. Soc.*, 83, 362-368, 2000.

Kar, A., Kundu, S. and Patra, A., Surface defect-related luminescence properties of SnO_2 nanorods and nanoparticles,*J. Phys. Chem. C*, 115, 118-124, 2010.

Kasai, P. H., Electron spin resonance studies of donors and acceptors in ZnO,*Phys. Rev.*, 130, 989, 1963.

Kashinath C., Patila, S.T., Arunab, Tanu Mimani, Combustion synthesis: an update, Current Opinion in *Solid State and Materials Science* 6, 507, 2002.

Kato, K., Tsutai, I., Kamimura, T., Kaneko, F., Shinbo, K., Ohta, M. and Kawakami, T., Thermoluminescence properties of $SrAl_2O_4$: Eu sputtered films with long phosphorescence,*J. Lumin.*, 82, 213-220, 1999.

Katsumata, T., Toyomane, S., Sakai, R., Komuro, S. and Morikawa, T., Trap Levels in Eu-Doped SrAl2O4 Phosphor Crystals Co-Doped with Rare-Earth Elements,*J. Am. Ceram. Soc.*, 89, 932-936, 2006.

Ke, L., Lai, S. C., Ye, J. D., Kaixin, V. L. and Chua, S. J., Point defects analysis of zinc oxide thin films annealed at different temperatures with photoluminescence, Hall mobility, and low frequency noise,*J. Appl. Phys.*, 108, 084502, 2010.

Kikkawa, J. M. and Awschalom, D. D., Lateral drag of spin coherence in gallium arsenide,*Nature*, 397, 139-141, 1999.

Kim, B. J., Ryu, Y. R., Lee, T. S. and White, H. W., Output power enhancement of GaN light emitting diodes with p-type ZnO hole injection layer,*Appl. Phys. Lett.*, 94, 103506, 2009a.

Kim, D., Yang, J. and Hong, J., Ferromagnetism induced by Zn vacancy defect and lattice distortion in ZnO,*J. Appl. Phys.*, 106, 013908, 2009b.

Kim, K.-S.and Kim, H. W., Synthesis of ZnO nanorod on bare Si substrate using metal organic chemical vapor deposition,*Phys. B Condens. Matter*, 328, 368-371, 2003.

Kim,J. S., Park, W. I., Lee, Chul-Ho and Yi, Gyu-Chul, ZnO nanorod biosensor for highly sensitive detection of specific protein binding, *Journal of the Korean Physical Society*, 49,1 2006.

Kisi, E. H. and Elcombe, M. M., u Parameters for the wurtzite structure of ZnS and ZnO using powder neutron diffraction,*Acta Crystallogr. C*, 45, 1867-1870, 1989.

Klingshirn, C., ZnO: From basics towards applications,*Phys. Status Solidi B*, 244, 3027-3073, 2007.

Kohan, A. F., Ceder, G., Morgan, D. and Van de Walle, C. G., First-principles study of native point defects in ZnO,*Phys. Rev. B*, 61, 15019, 2000.

Kohls, M., Schmidt, T., Katschorek, H., Spanhel, L., Mueller, G., Mais, N., Wolf, A. and Forchel, A., A simple colloidal route to planar micropatterned Er@ ZnO amplifiers,*Adv. Mater.*, 11, 288-292, 1999.

Kolmakov, A. and Moskovits, M., Chemical sensing and catalysis by one-dimensional metal-oxide nanostructures,*Annu Rev Mater Res*, 34, 151-180, 2004.

Komuro, S., Katsumata, T., Morikawa, T., Zhao, X., Isshiki, H. and Aoyagi, Y., Highly erbium-doped zinc-oxide thin film prepared by laser ablation and its 1.54 μm emission dynamics,*J. Appl. Phys.*, 88, 7129-7136, 2000.

Kong, X. Y., Ding, Y., Yang, R. and Wang, Z. L., Single-crystal nanorings formed by epitaxial self-coiling of polar nanobelts,*Science*, 303, 1348-1351, 2004.

Krause-Rehberg, R. and Leipner, H. S., *Positron annihilation in semiconductors: defect studies*, Springer Science & Business Media,1999.

Krishnamurthy, S., McGuinness, C., Dorneles, L. S., Venkatesan, M., Coey, J. M. D., Lunney, J. G., Patterson, C. H., Smith, K. E., Learmonth, T. and Glans, P.-A., Soft-x-ray spectroscopic investigation of ferromagnetic Co-doped ZnO,*J. Appl. Phys.*, 99, 08M111, 2006.

Krishnan, D. and Pradeep, T., Precursor-controlled synthesis of hierarchical ZnO nanostructures, using oligoaniline-coated Au nanoparticle seeds,*J. Cryst.Growth*, 311, 3889-3897, 2009.

Kudo, A., Yanagi, H., Ueda, K., Hosono, H., Kawazoe, H. and Yano, Y., Fabrication of transparent p–n heterojunction thin film diodes based entirely on oxide semiconductors,*Appl. Phys. Lett.*, 75, 2851-2853, 1999.

Kumar, P., Singh, J. P., Kumar, Y., Gaur, A., Malik, H. K. and Asokan, K., Investigation of phase segregation in $Zn_{1-x}Mg_xO$ systems,*Curr. Appl. Phys.*, 12, 1166-1172, 2012.

Kuo, T.-J., Lin, C.-N., Kuo, C.-L. and Huang, M. H., Growth of ultralong ZnO nanowires on silicon substrates by vapor transport and their use as recyclable photocatalysts,*Chem. Mater.*, 19, 5143-5147, 2007.

Kwon, C. H., Hong, H.-K., Yun, D. H., Lee, K., Kim, S.-T., Roh, Y.-H. and Lee, B.-H., Thick-film zinc-oxide gas sensor for the control of lean air-to-fuel ratio in domestic combustion systems,*Sens. Actuators B Chem.*, 25, 610-613, 1995.

Laamanen, T., Ph.D. thesis by, "Defects in Persistent Luminescence Materials" Presented to the Laboratory of Materials Chemistry and Chemical Analysis,Department of Chemistry University of Turku, FINLAND and Graduate School of Materials Research, Turku, FINLAND,ISBN 978-951-29-4706-5 (PRINT), ISBN 978-951-29-4707-2 (PDF), ISSN 0082-7002, 2011

Langel, W. and Parrinello, M., Ab initio molecular dynamics of H_2O adsorbed on solid MgO,*J. Chem. Phys.*, 103, 3240-3252, 1995.

Lansdown, A. B. G. and Taylor, A., Zinc and titanium oxides: promising UV-absorbers but what influence do they have on the intact skin?,*Int. J. Cosmet. Sci.*, 19, 167-172, 1997.

Lao, J. Y., Wen, J. G. and Ren, Z. F., Hierarchical ZnO nanostructures,*Nano Lett.*, 2, 1287-1291, 2002.

Lathiotakis, N. N., Andriotis, A. N. and Menon, M., Codoping: A possible pathway for inducing ferromagnetism in ZnO,*Phys. Rev. B*, 78, 193311, 2008.

Law, M., Sirbuly, D. J., Johnson, J. C., Goldberger, J., Saykally, R. J. and Yang, P., Nanoribbon waveguides for subwavelength photonics integration,*Science*, 305, 1269-1273, 2004.

Lee, C.-H., Yoo, J., Doh, Y.-J.and Yi, G.-C., ZnO/$Mg_{0.2}Zn_{0.8}O$ coaxial nanorod heterostructures for high-performance electronic nanodevice applications,*Appl. Phys. Lett.*, 94, 043504-043504-3, 2009.

Lee, H.-J., Choi, S. H., Cho, C. R., Kim, H. K. and Jeong, S.-Y., The formation of precipitates in the ZnCoO system,*EPL Europhys.Lett.*, 72, 76, 2005.

Leszczynski, M. (1999) Common crystal structure of the group III-nitrides, in Properties, Processing and Applications of Gallium Nitride and Related Semiconductors (eds J.H. Edgar, S. Strite, I. Akasaki, H. Amano and C.Wetzel), EMIS Datareviews Series No. 23, INSPEC, The Institution of Electrical Engineers, Stevenage, UK, pp. 3–5.

Levin,E. M., Robbins, C. R. and McMurdie, H. F.,*Phase Diagrams for Ceramists*, American Ceramic Society, USA, vol. 6, 1964.

Li, H., Yin, S. and Sato, T., Persistent deNOx Ability of $CaAl_2O_4$:(Eu, Nd)/TiO_{2-x}Ny Luminescent Photocatalyst,*Nanoscale Res. Lett.*, 6, 5, 2010.

Li, H., Yin, S., Wang, Y. and Sato, T., Effect of phase structures of $TiO_{2-x}N_y$ on the photocatalytic activity of $CaAl_2O_4$:(Eu, Nd)-coupled $TiO_{2-x}N_y$, *J. Catal.*, 286, 273-278, 2012.

Li, P., Wei, Y., Liu, H. and Wang, X., Growth of well-defined ZnO microparticles with additives from aqueous solution,*J. Solid State Chem.*, 178, 855-860, 2005.

Li, Q. H., Wan, Q., Liang, Y. X. and Wang, T. H., Electronic transport through individual ZnO nanowires,*Appl. Phys. Lett.*, 84, 4556-4558, 2004.

Li, T., Ong, C. S., Herng, T. S., Yi, J. B., Bao, N. N., Xue, J. M., Feng, Y. P. and Ding, J., Surface ferromagnetism in hydrogenated-ZnO film,*Appl. Phys. Lett.*, 98, 152505-152505-3, 2011.

Li, W.-J., Shi, E.-W., Zhong, W.-Z.and Yin, Z.-W., Growth mechanism and growth habit of oxide crystals,*J. Cryst. Growth*, 203, 186-196, 1999.

Li, X.-L., Wang, Z.-L., Qin, X.-F., Wu, H.-S., Xu, X.-H.and Gehring, G. A., Enhancement of magnetic moment of Co-doped ZnO films by postannealing in vacuum,*J. Appl. Phys.*, 103, 023911-023911-5, 2008.

Li, Y., Meng, G. W., Zhang, L. D. and Phillipp, F., Ordered semiconductor ZnO nanowire arrays and their photoluminescence properties,*Appl. Phys. Lett.*, 76, 2011-2013, 2000.

Li, Y.-Q., Fu, S.-Y.and Mai, Y.-W., Preparation and characterization of transparent ZnO/epoxy nanocomposites with high-UV shielding efficiency,*Polymer*, 47, 2127-2132, 2006.

Lim, Z. H., Chia, Z. X., Kevin, M., Wong, A. S. W. and Ho, G. W., A facile approach towards ZnO nanorods conductive textile for room temperature multifunctional sensors,*Sens. Actuators B Chem.*, 151, 121-126, 2010.

Lima, S. A. M., Sigoli, F. A., Davolos, M. R. and Jafelicci, M., Europium (III)-containing zinc oxide from Pechini method,*J. Alloys Compd.*, 344, 280-284, 2002.

Lin, C.-C., Chen, H.-P., Liao, H.-C. and Chen, S.-Y., Enhanced luminescent and electrical properties of hydrogen-plasma ZnO nanorods grown on wafer-scale flexible substrates,*Appl. Phys. Lett.*, 86, 183103-183103-3, 2005.

Lin, J. M., Cheng, C. L., Lin, H. Y. and Chen, Y. F., Giant enhancement of band edge emission in ZnO and SnO nanocomposites,*Opt. Lett.*, 31, 3173-3175, 2006.

Lin, S. S., Lu, J. G., Ye, Z. Z., He, H. P., Gu, X. Q., Chen, L. X., Huang, J. Y. and Zhao, B. H., p-type behavior in Na-doped ZnO films and ZnO homojunction light-emitting diodes,*Solid State Commun.*, 148, 25-28, 2008.

Ling, T., Wu, M.-K., Niu, K.-Y., Yang, J., Gao, Z.-M., Sun, J. and Du, X.-W., Spongy structure of CdS nanocrystals decorated with dye molecules for semiconductor sensitized solar cells,*J. Mater. Chem.*, 21, 2883-2889, 2011.

Lippincott, E. R., Psellos, J. A. and Tobin, M. C., The Raman spectra and structures of aluminate and zincate ions,*J. Chem. Phys.*, 20, 536-536, 1952.

Liu, B. and Zeng, H. C., Hydrothermal synthesis of ZnO nanorods in the diameter regime of 50 nm,*J. Am. Chem. Soc.*, 125, 4430-4431, 2003.

Liu, B. and Zeng, H. C., Mesoscale organization of CuO nanoribbons: formation of "dandelions," *J. Am. Chem. Soc.*, 126, 8124-8125, 2004.

Liu, C. H., Yiu, W. C., Au, F. C. K., Ding, J. X., Lee, C. S. and Lee, S. T., Electrical properties of zinc oxide nanowires and intramolecular p-n junctions,*Appl. Phys. Lett.*, 83, 3168-3170, 2003.

Liu, C., Yun, F. and Morkoc, H., Ferromagnetism of ZnO and GaN: A review,*J. Mater. Sci. Mater. Electron.*, 16, 555-597, 2005.

Liu, H., Yang, D., Yang, H., Zhang, H., Zhang, W., Fang, Y., Lin, Z., Tian, L., Lin, B. and Yan, J., Comparative study of respiratory tract immune toxicity induced by three sterilisation nanoparticles: silver, zinc oxide and titanium dioxide,*J. Hazard. Mater.*, 248, 478-486, 2013.

Liu, H., Zhang, X., Li, L., Wang, Y. X., Gao, K. H., Li, Z. Q., Zheng, R. K., Ringer, S. P., Zhang, B. and Zhang, X. X., Role of point defects in room-temperature ferromagnetism of Cr-doped ZnO,*Appl. Phys. Lett.*, 91, 072511, 2007a.

Liu, J., Zhao, Y., Jiang, Y. J., Lee, C. M., Liu, Y. L. and Siu, G. G., Identification of zinc and oxygen vacancy states in nonpolar ZnO single crystal using polarized photoluminescence,*Appl. Phys. Lett.*, 97, 231907, 2010.

Liu, M., Kitai, A. H. and Mascher, P., Point defects and luminescence centres in zinc oxide and zinc oxide doped with manganese,*J. Lumin.*, 54, 35-42, 1992.

Liu, X. C., Shi, E. W., Chen, Z. Z., Zhang, H. W., Xiao, B. and Song, L. X., High-temperature ferromagnetism in (Co, Al)-codoped ZnO powders,*Appl. Phys. Lett.*, 88, 252503, 2006.

Liu, X. J., Song, C., Zeng, F., Wang, X. B. and Pan, F., Influence of annealing on microstructure and magnetic properties of co-sputtered Co-doped ZnO thin films,*J. Phys. Appl. Phys.*, 40, 1608, 2007b.

Liu,X., Wang,C., Liu,X., Ouyang,L., You,Z., Lu,Y. and Chen,X.,*Journal of Nanomaterials*/ http://dx.doi.org/10.1155/2013/938370

Look, D. C. and Claflin, B., P-type doping and devices based on ZnO,*Phys. Status Solidi B*, 241, 624-630, 2004.

Look, D. C., Hemsky, J. W. and Sizelove, J. R., Residual native shallow donor in ZnO,*Phys. Rev. Lett.*, 82, 2552, 1999.

Look, D. C., Jones, R. L., Sizelove, J. R., Garces, N. Y., Giles, N. C. and Halliburton, L. E., The path to ZnO devices: donor and acceptor dynamics,*Phys. Status Solidi A*, 195, 171-177, 2003.

Look, D. C., Recent advances in ZnO materials and devices,*Mater. Sci. Eng. B*, 80, 383-387, 2001.

Look, D. C., Reynolds, D. C., Sizelove, J. R., Jones, R. L., Litton, C. W., Cantwell, G. and Harsch, W. C., Electrical properties of bulk ZnO,*Solid State Commun.*, 105, 399-401, 1998.

Look, D., Donors and acceptors in bulk ZnO grown by the hydrothermal, vapor-phase, and melt processes,*MRS Proceedings*, Cambridge Univ Press, 2007.

Lu, C.-H.and Yeh, C.-H., Influence of hydrothermal conditions on the morphology and particle size of zinc oxide powder,*Ceram. Int.*, 26, 351-357, 2000.

Lu, Y. F., Ni, H. Q., Mai, Z. H. and Ren, Z. M., The effects of thermal annealing on ZnO thin films grown by pulsed laser deposition,*J. Appl. Phys.*, 88, 498-502, 2000.

Lu, Z., Xu, J., Xie, X., Wang, H., Wang, C., Kwok, S.-Y., Wong, T., Kwong, H. L., Bello, I. and Lee, C.-S., CdS/CdSe double-sensitized ZnO nanocable arrays synthesized by chemical solution method and their photovoltaic applications,*J. Phys. Chem. C*, 116, 2656-2661, 2012.

Lyu, S. C., Zhang, Y., Ruh, H., Lee, H.-J., Shim, H.-W., Suh, E.-K.and Lee, C. J., Low temperature growth and photoluminescence of well-aligned zinc oxide nanowires,*Chem. Phys. Lett.*, 363, 134-138, 2002.

Ma, C. and Sun, X., Preparation of nanocrystalline metal oxide powders with the surfactant-mediated method,*Inorg. Chem. Commun.*, 5, 751-755, 2002.

Ma, X. and Zachariah, M. R., Size-resolved kinetics of Zn nanocrystal hydrolysis for hydrogen generation,*Int. J. Hydrog.Energy*, 35, 2268-2277, 2010.

MacManus-Driscoll, J. L., Khare, N., Liu, Y. and Vickers, M. E., Structural Evidence for Zn Intersititials in Ferromagnetic Zn1-xCoxO Films,*Adv. Mater.*, 19, 2925-2929, 2007.

Makino, T., Segawa, Y., Kawasaki, M., Ohtomo, A., Shiroki, R., Tamura, K., Yasuda, T. and Koinuma, H., Band gap engineering based on $Mg_xZn_{1-x}O$ and $Cd_yZn_{1-y}O$ ternary alloy films,*Appl. Phys. Lett.*, 78, 1237-1239, 2001.

Manjon, F. J., Mari, B., Serrano, J. and Romero, A. H., Silent Raman modes in zinc oxide and related nitrides,*J. Appl. Phys.*, 97, 053516, 2005.

McCluskey, M. D. and Jokela, S. J., Defects in ZnO,*J. Appl. Phys.*, 106, 071101, 2009.

Meulenkamp, E. A., Synthesis and growth of ZnO nanoparticles,*J. Phys. Chem. B*, 102, 5566-5572, 1998.

Meyer, B. K., Alves, H., Hofmann, D. M., Kriegseis, W., Forster, D., Bertram, F., Christen, J., Hoffmann, A., Straßburg, M. and Dworzak, M., Bound exciton and donor–acceptor pair recombinations in ZnO,*Phys. Status Solidi B*, 241, 231-260, 2004.

Michael, S. E. C. B. I., Tsuzukib, S. R. T. and McCormickb, T. A. R. P., Human skin penetration of sunscreen nanoparticles: in-vitro assessment of a novel micronized zinc oxide formulation,*Skin Pharmacol Physiol*, 20, 148-154, 2007.

Mimani, T. and Patil, K. C., Solution combustion synthesis of nanoscale oxides and their composites,*Mater. Phys. Mech.*, 4, 134-137, 2001.

Mimani, T., Instant synthesis of nanoscale spinel aluminates,*J. Alloys Compd.*, 315, 123-128, 2001.

Mirhosseini, M. and Firouzabadi, F. B., Antibacterial activity of zinc oxide nanoparticle suspensions on food-borne pathogens,*Int. J. Dairy Technol.*, 66, 291-295, 2013.

Mirhosseini, M., Firouzabadi, F., Antibacterial activity of zinc oxide nanoparticle suspensions on food-borne pathogens, *Int. J. Dairy Technol. 65*, 1, 2012.

Mishra, A. K., Chaudhuri, S. K., Mukherjee, S., Priyam, A., Saha, A. and Das, D., Characterization of defects in ZnO nanocrystals: Photoluminescence and positron annihilation spectroscopic studies,*J. Appl. Phys.*, 102, 103514, 2007.

Moezzi, A., Cortie, M. and McDonagh, A. M., Formation of zinc hydroxide Nitrate by H^+-catalyzed dissolution-precipitation,*Eur. J. Inorg.Chem.*, 2013, 1326-1335, 2013.

Molarius, J., Kaitila, J., Pensala, T. and Ylilammi, M., Piezoelectric ZnO films by rf sputtering,*J. Mater. Sci. Mater. Electron.*, 14, 431-435, 2003.

Mollwo, E., Müller, G. and Wagner, P., Energetische lage des Cu-akzeptorniveaus in ZnO-Einkristallen,*Solid State Commun.*, 13, 1283-1287, 1973.

Monteiro, T., Soares, M. J., Neves, A., Pereira, S., Correia, M. R., Peres, M., Alves, E., Rogers, D., Teherani, F. and Munoz-SanJose, V., Optical active centres in ZnO samples,*J. Non-Cryst.Solids*, 352, 1453-1456, 2006.

Morimoto,K., in Phosphor Handbook, ed. S. Shionoya, W. M. Ren, CRC Press, Cleveland, 1999, p. 561.

Morkoç, H. and Özgür, Ü.,*Zinc oxide: fundamentals, materials and device technology*, John Wiley & Sons, 2008.

Murayama, Y., Takeuchi, N., Aoki, Y. and Matsuzawa, T., *Phosphorescent phosphor*, Google Patents,1995.

Musić, S., Dragčević, Đ. and Popović, S., Influence of synthesis route on the formation of ZnO particles and their morphologies,*J. Alloys Compd.*, 429, 242-249, 2007.

Myong, S. Y. and Lim, K. S., Improved electrical stability and UV emission of zinc oxide thin films prepared by combination of metalorganic chemical vapor deposition technique and post-deposition hydrogen doping,*Org. Electron.*, 8, 51-56, 2007.

Nag, A. and Kutty, T. R. N., Role of B_2O_3on the phase stability and long phosphorescence of $SrAl_2O_4$: Eu, Dy,*J. Alloys Compd.*, 354, 221-231, 2003.

Nakamura, S. and Chichibu, S F, (ed) 2000 *Nitride Semiconductor Blue Lasers and Light Emitting Diodes* (Boca Raton, FL: CRC Press)

Nayak, J., Sahu, S. N., Kasuya, J. and Nozaki, S., CdS-ZnO composite nanorods: synthesis, characterization and application for photocatalytic degradation of 3, 4-dihydroxy benzoic acid,*Appl. Surf. Sci.*, 254, 7215-7218, 2008.

Ney, A., Ney, V., Ye, S., Ollefs, K., Kammermeier, T., Kaspar, T. C., Chambers, S. A., Wilhelm, F. and Rogalev, A., Magnetism of Co doped ZnO with Al codoping: Carrier-induced mechanisms versus extrinsic origins,*Phys. Rev. B*, 82, 041202, 2010.

Ng, H. T., Chen, B., Li, J., Han, J., Meyyappan, M., Wu, J., Li, S. X. and Haller, E. E., Optical properties of single-crystalline ZnO nanowires on m-sapphire,*Appl. Phys. Lett.*, 82, 2023-2025, 2003.

Nicholas, N. J., Franks, G. V. and Ducker, W. A., The mechanism for hydrothermal growth of zinc oxide,*CrystEngComm*, 14, 1232-1240, 2012.

Nickel, N. H. and Terukov, E., *Zinc oxide-a material for micro-and optoelectronic applications*, Springer, vol.3, 2005.

Nikitin, S. E., Nikolaev, Y. A., Polushina, I. K., Rud, V. Y., Rud, Y. V. and Terukov, E. I., Photoelectric phenomena in ZnO: Al-p-Si heterostructures,*Semiconductors*, 37, 1291-1295, 2003.

Nikitin, S. E., Nikolaev, Y. A., Rud, V. Y., Rud, Y. V., Terukov, E. I., Fernelius, N. and Goldstein, J., Oscillations of induced photopleochroism in ZnO/GaAs heterojunctions,*Semiconductors*, 38, 393-396, 2004.

Nishizawa, H., Tani, T. and Matsuoka, K., Crystal Growth of ZnO by Hydrothermal Decomposition of Zn-EDTA,*J. Am. Ceram.Soc.*, 67, C-98-C-100, 1984.

Noei, H., Qiu, H., Wang, Y., Löffler, E., Wöll, C. and Muhler, M., The identification of hydroxyl groups on ZnO nanoparticles by infrared spectroscopy,*Phys. Chem. Chem. Phys.*, 10, 7092-7097, 2008.

Ogale, S. B., *Thin films and heterostructures for oxide electronics*, Springer vol. 3, 2006.

Ohashi, N., Ishigaki, T., Okada, N., Taguchi, H., Sakaguchi, I., Hishita, S., Sekiguchi, T. and Haneda, H., Passivation of active recombination centers in ZnO by hydrogen doping,*J. Appl. Phys.*, 93, 6386-6392, 2003.

Ohta, H., Hirano, M., Nakahara, K., Maruta, H., Tanabe, T., Kamiya, M., Kamiya, T. and Hosono, H., Fabrication and photoresponse of a pn-heterojunction diode composed of transparent oxide semiconductors, p-NiO and n-ZnO,*Appl. Phys. Lett.*, 83, 1029-1031, 2003a.

Ohta, H., Kawamura, K., Orita, M., Hirano, M., Sarukura, N. and Hosono, H., Current injection emission from a transparent p-n junction composed of p-$SrCu_2O_2$/n-ZnO,*Appl. Phys. Lett.*, 77, 475-477, 2000.

Ohta, H., Mizoguchi, H., Hirano, M., Narushima, S., Kamiya, T. and Hosono, H., Fabrication and characterization of heteroepitaxial pn junction diode composed of wide-gap oxide semiconductors p-$ZnRh_2O_4$/n-ZnO,*Appl. Phys. Lett.*, 82, 823-825, 2003b.

Ohtomo, A., Kawasaki, M., Koida, T., Masubuchi, K., Koinuma, H., Sakurai, Y., Yoshida, Y., Yasuda, T. and Segawa, Y., $Mg_xZn_{1-x}O$ as a II-VI widegap semiconductor alloy,*Appl. Phys. Lett.*, 72, 2466-2468, 1998.

Ohtomo, A., Shiroki, R., Ohkubo, I., Koinuma, H. and Kawasaki, M., Thermal stability of supersaturated $Mg_xZn_{1-x}O$ alloy films and $Mg_xZn_{1-x}O$/ZnO heterointerfaces,*Appl. Phys. Lett.*, 75, 4088-4090, 1999.

Osinsky, A., Dong, J. W., Kauser, M. Z., Hertog, B., Dabiran, A. M., Chow, P. P., Pearton, S. J., Lopatiuk, O. and Chernyak, L., MgZnO/AlGaN heterostructure light-emitting diodes,*Appl. Phys. Lett.*, 85, 4272-4274, 2004.

Özgür, Ü., Alivov, Y. I., Liu, C., Teke, A., Reshchikov, M. A., Doğan, S., Avrutin, V., Cho, S.-J. and Morkoc, H., A comprehensive review of ZnO materials and devices,*J. Appl. Phys.*, 98, 041301, 2005.

Ozgur, U., Hofstetter, D. and Morkoc, H., ZnO devices and applications: a review of current status and future prospects,*Proc. IEEE*, 98, 1255-1268, 2010.

Pan, C.-J., Hsu, H.-C., Cheng, H.-M., Wu, C.-Y. and Hsieh, W.-F., Structural and optical properties of ZnMgO nanostructures formed by Mg in-diffused ZnO nanowires,*J. Solid State Chem.*, 180, 1188-1192, 2007.

Pan, F., Song, C., Liu, X. J., Yang, Y. C. and Zeng, F., Ferromagnetism and possible application in spintronics of transition-metal-doped ZnO films,*Mater. Sci. Eng. R Rep.*, 62, 1-35, 2008.

Pan, H., Luo, J., Sun, H., Feng, Y., Poh, C. and Lin, J., Hydrogen storage of ZnO and Mg doped ZnO nanowires,*Nanotechnology*, 17, 2963, 2006.

Pan, Z. W., Dai, Z. R. and Wang, Z. L., Nanobelts of semiconducting oxides,*Science*, 291, 1947-1949, 2001.

Panatarani, C., Lenggoro, I. W. and Okuyama, K., The crystallinity and the photoluminescent properties of spray pyrolized ZnO phosphor containing Eu^{2+} and Eu^{3+} ions,*J. Phys. Chem. Solids*, 65, 1843-1847, 2004.

Paneva, R., Temmel, G., Burte, E. and Ryssel, H., Micromechanical ultrasonic liquid nebulizer,*Sens. Actuators Phys.*, 62, 765-767, 1997.

Panigrahy, B., Aslam, M. and Bahadur, D., Aqueous synthesis of Mn-and Co-doped ZnO nanorods,*J. Phys. Chem. C*, 114, 11758-11763, 2010.

Park, C. H., Zhang, S. B. and Wei, S.-H., Origin of p-type doping difficulty in ZnO: The impurity perspective,*Phys. Rev. B*, 66, 073202, 2002.

Park, S. K., Park, J. H., Ko, K. Y., Yoon, S., Chu, K. S., Kim, W. and Do, Y. R., Hydrothermal- Electrochemical Synthesis of ZnO Nanorods,*Cryst. Growth Des.*, 9, 3615-3620, 2009.

Park, W. I., Kim, J. S., Yi, G.-C., Bae, M. H. and Lee, H.-J., Fabrication and electrical characteristics of high-performance ZnO nanorod field-effect transistors,*Appl. Phys. Lett.*, 85, 5052-5054, 2004.

Park, Y. R. and Kim, Y. S., Organic light-emitting diodes with hydrogenated In-doped ZnO thin films as transparent conductive electrodes,*J. Mater. Res.*, 23, 1674-1681, 2008.

Parks, G. A., The isoelectric points of solid oxides, solid hydroxides, and aqueous hydroxo complex systems,*Chem. Rev.*, 65, 177-198, 1965.

Patil, K. C., Aruna, S. T. and Mimani, T., Combustion synthesis: an update,*Curr. Opin.Solid State Mater.Sci.*, 6, 507-512, 2002.

Pearton, S. J., Norton, D. P., Ip, K., Heo, Y. W. and Steiner, T., Recent progress in processing and properties of ZnO,*Superlattices Microstruct.*, 34, 3-32, 2003.

Peleg, M., Raman spectroscopic investigation of the magnesium nitrate-water system,*J. Phys. Chem.*, 76, 1019-1025, 1972.

Peng, W. Q., Qu, S. C., Cong, G. W. and Wang, Z. G., Synthesis and temperature-dependent near-band-edge emission of chain-like Mg-doped ZnO nanoparticles,*Appl. Phys. Lett.*, 88, 101902, 2006.

Photongkam, P., Zhang, Y. B., Assadi, M. H. N., Li, S., Yu, D., Ionescu, M. and Pan, A. V., Enhancement of Co substitution induced by Eu codoping in ZnO-based diluted magnetic semiconducting thin films,*J. Appl. Phys.*, 107, 033909, 2010.

Pirot, F., Millet, J., Kalia, Y. N. and Humbert, P., In vitro study of percutaneous absorption, cutaneous bioavailability and bioequivalence of zinc and copper from five topical formulations,*Skin Pharmacol. Physiol.*, 9, 259-269, 1996.

Pradhan, A. K., Zhang, K., Loutts, G. B., Roy, U. N., Cui, Y. and Burger, A., Structural and spectroscopic characteristics of ZnO and ZnO: Er^{3+} nanostructures,*J. Phys. Condens. Matter*, 16, 7123, 2004.

Prodjosantoso, A. K. and Kennedy, B. J., Synthesis and Evolution of the Crystalline Phases in Ca_{1-x} $Sr_xAl_2O_4$, *J. Solid State Chem.*, 168, 229-236, 2002.

Qiu, J., Jin, Z., Liu, Z., Liu, X., Liu, G., Wu, W., Zhang, X. and Gao, X., Fabrication of TiO_2 nanotube film by well-aligned ZnO nanorod array film and sol-gel process,*Thin Solid Films*, 515, 2897-2902, 2007.

Rahman, M. M., Khan, M. K. R., Islam, M. R., Halim, M. A., Shahjahan, M., Hakim, M. A., Saha, D. K. and Khan, J. U., Effect of Al doping on structural, electrical, optical and photoluminescence properties of nano-structural ZnO thin films,*J. Mater. Sci. Technol.*, 28, 329-335, 2012.

Raja, E. A., Dhabekar, B., Menon, S., More, S. P., Rao, T. G. and Kher, R. K., Role of defect centres in thermoluminescence mechanism of Tb^{3+} doped $MgAl_2O_4$,*Indian J. Pure Appl. Phys.*, 47, 420, 2009.

Rakkesh, R. A. and Balakumar, S., Structural, electrical transport and optical studies of Li ion doped ZnO nanostructures,*Process. Appl. Ceram.*, 8, 7-13, 2014.

Ramachandran, S., Narayan, J. and Prater, J. T., Effect of oxygen annealing on Mn doped ZnO diluted magnetic semiconductors,*Appl. Phys. Lett.*, 88, 242503, 2006.

Rao, G. T. and Rao, D. T., Gas sensitivity of ZnO based thick film sensor to NH_3 at room temperature,*Sens. Actuators B Chem.*, 55, 166-169, 1999.

Rath, C., Mallick, P., Pandey, D., Sa, D., Banerjee, A. and Mishra, N. C., Anomalous x-ray diffraction peak broadening and lattice strains in $Zn_{1-x}Co_xO$ dilute magnetic semiconductors,*J. Phys. Condens. Matter*, 21, 075801, 2009.

Red, J. S., *Introduction to the principles of ceramic processing*, Wiley, New York,1988.

Reeber, R. R., Lattice parameters of ZnO from 4.2 to 296 K,*J. Appl. Phys.*, 41, 5063-5066, 1970.

Ristić, M., Musić, S., Ivanda, M. and Popović, S., Sol-gel synthesis and characterization of nanocrystalline ZnO powders,*J. Alloys Compd.*, 397, L1-L4, 2005.

Roessler, D. M. and Walker, W. C., Electronic spectrum and ultraviolet optical properties of crystalline MgO,*Phys. Rev.*, 159, 733, 1967.

Ronning, C., Gao, P. X., Ding, Y., Wang, Z. L. and Schwen, D., Manganese-doped ZnO nanobelts for spintronics,*Appl. Phys. Lett.*, 84, 783-785, 2004.

Roy, S., Sigmund, W. and Aldinger, F., Nanostructured yttria powders via gel combustion,*J. Mater. Res.*, 14, 1524-1531, 1999.

Roy, V. A. L., Djurišić, A. B., Chan, W. K., Gao, J., Lui, H. F. and Surya, C., Luminescent and structural properties of ZnO nanorods prepared under different conditions,*Appl. Phys. Lett.*, 83, 141-143, 2003.

Ryu, H.-W., Park, B.-S., Akbar, S. A., Lee, W.-S., Hong, K.-J., Seo, Y.-J., Shin, D.-C., Park, J.-S.and Choi, G.-P., ZnO sol-gel derived porous film for CO gas sensing,*Sens. Actuators B Chem.*, 96, 717-722, 2003.

Samanta, K., Bhattacharya, P., Katiyar, R. S., Iwamoto, W., Pagliuso, P. G. and Rettori, C., Raman scattering studies in dilute magnetic semiconductor $Zn_{1-x}Co_xO$,*Phys. Rev. B*, 73, 245213, 2006.

Sberveglieri, G., Recent developments in semiconducting thin-film gas sensors,*Sens. Actuators B Chem.*, 23, 103-109, 1995.

Scherrer,P. *Göttinger Nachrichten Gesell.*, vol. 2, p 98, 1918.

Schulze, A.-R.and Buschbaum, H., Zur Verbindungsbildung von MeO: M_2O_3. IV. Zur Struktur von monoklinem $SrAl_2O_4$,*Z. Für Anorg.Allg.Chem.*, 475, 205-210, 1981.

Schwartz, D. A. and Gamelin, D. R., Reversible 300 K ferromagnetic ordering in a diluted magnetic semiconductor,*Adv. Mater.*, 16, 2115-2119, 2004.

Segnit, E. R. and Holland, A. E., The System MgO-ZnO-SiO_2,*J. Am. Ceram. Soc.*, 48, 409-413, 1965.

Sendi, R. and Mahmud, S., Stress Control in ZnO Nanoparticle-based Discs via High-Oxygen Thermal Annealing at Various Temperatures,*J. Phys. Sci.*, 24, 1-15, 2013.

Serrano, J., Romero, A. H., Manjon, F. J., Lauck, R., Cardona, M. and Rubio, A., Pressure dependence of the lattice dynamics of ZnO: An ab initio approach,*Phys. Rev. B*, 69, 094306, 2004.

Shafia, E., Bodaghi, M. and Tahriri, M., The influence of some processing conditions on host crystal structure and phosphorescence properties of $SrAl_2O_4$: Eu^{2+}, Dy^{3+} nanoparticle pigments synthesized by combustion technique,*Curr. Appl. Phys.*, 10, 596-600, 2010.

Shah, L. R., Wang, W., Zhu, H., Ali, B., Song, Y. Q., Zhang, H. W., Shah, S. I. and Xiao, J. Q., Role of dopant, defect, and host oxide in the observed room temperature ferromagnetism: Co-ZnO versus Co-CeO_2,*J. Appl. Phys.*, 105, 07C515-07C515-3, 2009.

Shan, F. K., Kim, B. I., Liu, G. X., Liu, Z. F., Sohn, J. Y., Lee, W. J., Shin, B. C. and Yu, Y. S., Blueshift of near band edge emission in Mg doped ZnO thin films and aging,*J. Appl. Phys.*, 95, 4772-4776, 2004.

Sharma, S. K. and Exarhos, G. J., Raman spectroscopic investigation of ZnO and doped ZnO films, nanoparticles and bulk material at ambient and high pressures,*Solid State Phenom.*, 55, 32-37, 1997.

Shen, G., Bando, Y., Chen, D., Liu, B., Zhi, C. and Golberg, D., Morphology-controlled synthesis of ZnO nanostructures by a simple round-to-round metal vapor deposition route,*J. Phys. Chem. B*, 110, 3973-3978, 2006.

Shi, W. S., Yamada, H., Nishikubo, K., Kusaba, H. and Xu, C. N., Novel structural behavior of strontium aluminate doped with europium,*J. Electrochem. Soc.*, 151, H97-H100, 2004.

Shin, C. M., Heo, J. H., Park, J. H., Lee, T. M., Ryu, H., Shin, B. C., Lee, W. J. and Kim, H.-K., The effect of pH on ZnO hydrothermal growth on PES flexible substrates,*Phys. E Low-Dimens. Syst. Nanostructures*, 43, 54-57, 2010.

Simon, Q., Barreca, D., Gasparotto,A., Maccato,C., Montini,T., Gombac,V., Fornasiero,P., Lebedev, O. I., Turner,S. and Tendeloo, G. van,*J. Mater.Chem.*22, 11739, 2012.

Singh, S., Thiyagarajan, P., Kant, K. M., Anita, D., Thirupathiah, S., Rama, N., Tiwari, B., Kottaisamy, M. and Rao, M. R., Structure, microstructure and physical properties of ZnO based materials in various forms: bulk, thin film and nano,*J. Phys. Appl. Phys.*, 40, 6312, 2007.

Sluiter, M. H., Kawazoe, Y., Sharma, P., Inoue, A., Raju, A. R., Rout, C. and Waghmare, U. V., First principles based design and experimental evidence for a ZnO-based ferromagnet at room temperature,*Phys. Rev. Lett.*, 94, 187204, 2005.

Song, C., Geng, K. W., Zeng, F., Wang, X. B., Shen, Y. X., Pan, F., Xie, Y. N., Liu, T., Zhou, H. T. and Fan, Z., Giant magnetic moment in an anomalous ferromagnetic insulator: Co-doped ZnO,*Phys. Rev. B*, 73, 024405, 2006.

Song, C., Zeng, F., Geng, K. W., Liu, X. J., Pan, F., He, B. and Yan, W. S., Substrate-dependent magnetization in Co-doped ZnO insulating films,*Phys. Rev. B*, 76, 045215, 2007.

Song, J.-I., Park, J.-S., Kim, H., Heo, Y.-W., Lee, J.-H., Kim, J.-J., Kim, G. M. and Choi, B. D., Transparent amorphous indium zinc oxide thin-film transistors fabricated at room temperature,*Appl. Phys. Lett.*, 90, 022106, 2007.

Sousa, V. C., Segadaes, A. M., Morelli, M. R. and Kiminami, R., Combustion synthesized ZnO powders for varistor ceramics,*Int. J. Inorg. Mater.*, 1, 235-241, 1999.

Spaldin, N. A., Search for ferromagnetism in transition-metal-doped piezoelectric ZnO,*Phys. Rev. B*, 69, 125201, 2004.

Suchanek, W. L. and Riman, R. E., Hydrothermal synthesis of advanced ceramic powders,*Adv. Sci. Technol.*, 45, 184-193, 2006.

Sudakar, C., Kharel, P., Lawes, G., Suryanarayanan, R., Naik, R. and Naik, V. M., Raman spectroscopic studies of oxygen defects in Co-doped ZnO films exhibiting room-temperature ferromagnetism,*J. Phys. Condens. Matter*, 19, 026212, 2007.

Sugunan, A., Warad, H. C., Boman, M. and Dutta, J., Zinc oxide nanowires in chemical bath on seeded substrates: role of hexamine,*J. Sol-Gel Sci. Technol.*, 39, 49-56, 2006.

Sun, H., Pan, L., Piao, X. and Sun, Z., Long afterglow $SrAl_2O_4$: Eu, Dy phosphors for CdS quantum dot-sensitized solar cells with enhanced photovoltaic performance,*J. Mater. Chem.A*, 1, 6388-6392, 2013.

Sun, X. M., Chen, X., Deng, Z. X. and Li, Y. D., A CTAB-assisted hydrothermal orientation growth of ZnO nanorods,*Mater. Chem. Phys.*, 78, 99-104, 2003.

Sun, Y., Wang, L., Yu, X. and Chen, K., Facile synthesis of flower-like 3D ZnO superstructures via solution route,*CrystEngComm*, 14, 3199-3204, 2012.

Sundaresan, A., Bhargavi, R., Rangarajan, N., Siddesh, U. and Rao, C. N. R., Ferromagnetism as a universal feature of nanoparticles of the otherwise nonmagnetic oxides,*Phys. Rev. B Condens. Matter Mater. Phys.*, 74, 161306_1-161306_4, 2006.

Tam, K. H., Cheung, C. K., Leung, Y. H., Djurišic, A. B., Ling, C. C., Beling, C. D., Fung, S., Kwok, W. M., Chan, W. K. and Phillips, D. L., Defects in ZnO nanorods prepared by a hydrothermal method,*J. Phys. Chem. B*, 110, 20865-20871, 2006.

Tanasa, D., Vrinceanu, N., Nistor, A., Hristodor, C. M., Popovici, E., Bistricianu, I. L., Brinza, F., Chicet, D. L., Coman, D. and Pui, A., Zinc oxide-linen fibrous composites: morphological, structural, chemical and humidity adsorptive attributes,*Text. Res. J.*, 0040517511435068, 2012.

Tang, Y., Luo, L., Chen, Z., Jiang, Y., Li, B., Jia, Z. and Xu, L., Electrodeposition of ZnO nanotube arrays on TCO glass substrates,*Electrochem. Commun.*, 9, 289-292, 2007.

Tennakone, K., Senadeera, G. K. R., Perera, V. P. S., Kottegoda, I. R. M. and De Silva, L. A. A., Dye-sensitized photoelectrochemical cells based on porous SnO_2/ZnO composite and TiO_2 films with a polymer electrolyte,*Chem. Mater.*, 11, 2474-2477, 1999.

Trotochaud, L., Ranney, J. K., Williams, K. N. and Boettcher, S. W., Solution-cast metal oxide thin film electrocatalysts for oxygen evolution,*J. Am. Chem. Soc.*, 134, 17253-17261, 2012.

Tsurkan, A. E., Fedotova, N. D., Kicherman, L. V. and Pas' ko, P. G., Injection electroluminescence in n-ZnO-p-ZnTe heterojunctions, 1975.

Tuomisto, F., Ranki, V., Saarinen, K. and Look, D. C., Evidence of the Zn vacancy acting as the dominant acceptor in n-type ZnO,*Phys. Rev. Lett.*, 91, 205502, 2003.

Uddin, M. J., Cesano, F., Bertarione, S., Bonino, F., Bordiga, S., Scarano, D. and Zecchina, A., Tailoring the activity of Ti-based photocatalysts by playing with surface morphology and silver doping,*J. Photochem.Photobiol.Chem.*, 196, 165-173, 2008.

Ueda, K., Tabata, H. and Kawai, T., Magnetic and electric properties of transition-metal-doped ZnO films,*Appl. Phys. Lett.*, 79, 988-990, 2001.

Umar, A., Kim, B.-K., Kim, J.-J.and Hahn, Y. B., Optical and electrical properties of ZnO nanowires grown on aluminium foil by non-catalytic thermal evaporation,*Nanotechnology*, 18, 175606, 2007.

Valtiner, M., Borodin, S. and Grundmeier, G., Preparation and characterisation of hydroxide stabilised ZnO (0001)-Zn-OH surfaces,*Phys. Chem. Chem. Phys.*, 9, 2406-2412, 2007.

Van de Walle, C. G., Hydrogen as a cause of doping in zinc oxide,*Phys. Rev. Lett.*, 85, 1012, 2000.

Vanheusden, K., Seager, C. H., Warren, W. L., Tallant, D. R., Caruso, J., Hampden-Smith, M. J. and Kodas, T. T., Green photoluminescence efficiency and free-carrier density in ZnO phosphor powders prepared by spray pyrolysis,*J. Lumin.*, 75, 11-16, 1997.

Vayssieres, L., Keis, K., Lindquist, S.-E.and Hagfeldt, A., Purpose-built anisotropic metal oxide material: 3D highly oriented microrod array of ZnO,*J. Phys. Chem. B*, 105, 3350-3352, 2001.

Venkatesan, M., Fitzgerald, C. B., Lunney, J. G. and Coey, J. M. D., Anisotropic ferromagnetism in substituted zinc oxide,*Phys. Rev. Lett.*, 93, 177206, 2004.

Verma, R. K., Kumar, K. and Rai, S. B., Dual mode emission and harmonic generation in ZnO-CaO-Al_2O_3 Er^{3+}nano-composite,*J. Lumin.*, 131, 988-993, 2011.

Verma, R. K., Singh, A. K., Rai, D. K. and Rai, S. B., Defect level influenced optical properties of Eu^{3+} and Tb^{3+} doped in ZnO-$CaAl_xO_y$composite,*Mater. Chem. Phys.*, 135, 298-303, 2012.

Vigil, O., Vaillant, L., Cruz, F., Santana, G., Morales-Acevedo, A. and Contreras-Puente, G., Spray pyrolysis deposition of cadmium-zinc oxide thin films,*Thin Solid Films*, 361, 53-55, 2000.

Vigneshwaran, N., Kumar, S., Kathe, A. A., Varadarajan, P. V. and Prasad, V., Functional finishing of cotton fabrics using zinc oxide-soluble starch nanocomposites,*Nanotechnology*, 17, 5087, 2006.

Vogel, R., Hoyer, P. and Weller, H., Quantum-sized PbS, CdS, Ag_2S, Sb_2S_3, and Bi_2S_3 particles as sensitizers for various nanoporous wide-bandgap semiconductors,*J. Phys. Chem.*, 98, 3183-3188, 1994.

Wahab, R., Kim, Y.-S.and Shin, H.-S., Synthesis, characterization and effect of pH variation on zinc oxide nanostructures,*Mater. Trans.*, 50, 2092-2097, 2009.

Wan, W., Huang, J., Zhu, L., Hu, L., Wen, Z., Sun, L. and Ye, Z., Defects induced ferromagnetism in ZnO nanowire arrays doped with copper,*CrystEngComm*, 15, 7887-7894, 2013.

Wang, C.-X., Yang, G.-W., Liu, H.-W., Han, Y.-H., Luo, J.-F., Gao, C.-X. and Zou, G.-T., Experimental analysis and theoretical model for anomalously high ideality factors in ZnO/diamond pn junction diode,*Appl. Phys. Lett.*, 84, 2427-2429, 2004.

Wang, D., Chen, Z. Q., Wang, D. D., Qi, N., Gong, J., Cao, C. Y. and Tang, Z., Positron annihilation study of the interfacial defects in ZnO nanocrystals: Correlation with ferromagnetism,*J. Appl. Phys.*, 107, 023524-023524-8, 2010.

Wang, H., Chen, Y., Wang, H. B., Zhang, C., Yang, F. J., Duan, J. X., Yang, C. P., Xu, Y. M., Zhou, M. J. and Li, Q., High resolution transmission electron microscopy and Raman scattering studies of room temperature ferromagnetic Ni-doped ZnO nanocrystals,*Appl. Phys. Lett.*, 90, 052505, 2007.

Wang, J. and Gao, L., Wet chemical synthesis of ultralong and straight single-crystalline ZnO nanowires and their excellent UV emission properties,*J Mater Chem*, 13, 2551-2554, 2003.

Wang, M., Kim, E. J. and Hahn, S. H., Photoluminescence study of pure and Li-doped ZnO thin films grown by sol-gel technique,*J. Lumin.*, 131, 1428-1433, 2011.

Wang, Q., Sun, Q., Chen, G., Kawazoe, Y. and Jena, P., Vacancy-induced magnetism in ZnO thin films and nanowires,*Phys. Rev. B*, 77, 205411, 2008.

Wang, S. L., Zhu, H. W., Tang, W. H. and Li, P. G., Propeller-shaped ZnO nanostructures obtained by chemical vapor deposition: photoluminescence and photocatalytic properties,*J. Nanomater.*, 2012, 2, 2012.

Wang, Y., Ma, C., Sun, X., Li, H., Preparation of nanocrystalline metal oxide powders with the surfactant-mediated method., *Inorg. Chem. Commun*., *5*, 751, 2002.

Wang, Z. L., Nanostructures of zinc oxide,*Mater. Today*, 7, 26-33, 2004.

Wardle, M. G., Goss, J. P. and Briddon, P. R., Theory of Fe, Co, Ni, Cu, and their complexes with hydrogen in ZnO,*Phys. Rev. B*, 72, 155108, 2005.

Wei, M., Zhi, D. and MacManus-Driscoll, J. L., Self-catalysed growth of zinc oxide nanowires,*Nanotechnology*, 16, 1364, 2005.

Williamson, G. K. and Hall, W. H., X-ray line broadening from filed aluminium and wolfram,*Acta Metall.*, 1, 22-31, 1953.

Wöllenstein, J., Plaza, J. A., Cane, C., Min, Y., Böttner, H. and Tuller, H. L., A novel single chip thin film metal oxide array,*Sens. Actuators B Chem.*, 93, 350-355, 2003.

Woo, B. K., Ph.D. thesis "Physics Of Luminescence Nanomaterials" Presented to the Faculty of the Graduate School of The University of Texas at Arlington 2010

Wu, Q., Liu, Z. and Jiao, H., Luminescent properties of stabled hexagonal phase $Sr_{1-x}Ba_xAl_2O_4$: Eu^{2+} (x = 0.37- 0.70), *Phys. B Condens. Matter*, 404, 2499-2502, 2009.

Wuethrich, C. R., Muller, C. A., Fox, G. R. and Limberger, H. G., All-fibre acousto-optic modulator using ZnO piezoelectric actuators,*Sens. Actuators Phys.*, 66, 114-117, 1998.

Xie, R., Sekiguchi, T., Ishigaki, T., Ohashi, N., Li, D., Yang, D., Liu, B. and Bando, Y., Enhancement and patterning of ultraviolet emission in ZnO with an electron beam,*Appl. Phys. Lett.*, 88, 134103, 2006.

Xiong, G., Wilkinson, J., Tuzemen, S., Ucer, K. B. and Williams, R. T., Toward a new ultraviolet diode laser: luminescence and pn junctions in ZnO films,*Seventh International Conference on Laser and Laser*

Information Technologies, International Society for Optics and Photonics, 2002.

Xu, W. L., Zheng, M. J., Ding, G. Q. and Shen, W. Z., Fabrication and optical properties of highly ordered ZnO nanodot arrays,*Chem. Phys. Lett.*, 411, 37-42, 2005.

Xu, X. and Cao, C., Hydrothermal synthesis of Co-doped ZnO flakes with room temperature ferromagnetism,*J. Alloys Compd.*, 501, 265-268, 2010.

Xu, Y.-J., Zhuang, Y. and Fu, X., New insight for enhanced photocatalytic activity of TiO_2 by doping carbon nanotubes: a case study on degradation of benzene and methyl orange,*J. Phys. Chem. C*, 114, 2669-2676, 2010.

Yadav, R. V., Verma, R. K., Kaur, G. and Rai, S. B., Change in structural morphology on addition of ZnO and its effect on fluorescence of Yb^{3+}/Er^{3+} doped Y_2O_3,*Spectrochim. Acta. A. Mol. Biomol. Spectrosc.*, 103, 216-221, 2013.

Yakimova, R., Yazdi, G. R., Son, N. T., Ivanov, I., Syväjärvi, M., Sun, S., Tompa, G., Kuznetsov, A. and Svensson, B., Optical and morphological features of bulk and homoepitaxial ZnO,*Superlattices Microstruct.*, 39, 247-256, 2006.

Yan, B., Chen, X. and Wu, J., Induced assembly and photoluminescence of lanthanum (Tb, Eu, Dy) complexes/ZnO/polyethylene glycol hybrid phosphors,*Appl. Surf.Sci.*, 253, 8575-8580, 2007.

Yan, L., Ong, C. K. and Rao, X. S., Magnetic order in Co-doped and (Mn, Co) codoped ZnO thin films by pulsed laser deposition,*J. Appl. Phys.*, 96, 508-511, 2004.

Yang, P., Yan, H., Mao, S., Russo, R., Johnson, J., Saykally, R., Morris, N., Pham, J., He, R. and Choi, H.-J., Controlled growth of ZnO nanowires and their optical properties,*Adv. Funct. Mater.*, 12, 323, 2002.

Yao, B., Feng, L., Cheng, C., Loy, M. M. and Wang, N., Tailoring the luminescence emission of ZnO nanostructures by hydrothermal post-treatment in water,*Appl. Phys. Lett.*, 96, 223105-223105-3, 2010.

Yao, B., Shi, H., Bi, H. and Zhang, L., Optical properties of ZnO loaded in mesoporous silica,*J. Phys. Condens. Matter*, 12, 6265, 2000.

Yina, H., Xinye, J., Qiang, C., Ding, L. and Farong, W., PMMA with long-persistent phosphors and its behavior of luminescence,*J. Rare Earths*, 24, 157-159, 2006.

Youn, D.-H., Maeng, S.-L.and Kang, K.-Y., New growth method of ZnO nanostructures using sputter machines without heat treatment,*Jpn. J. Appl. Phys.*, 45, 8957, 2006.

Yu, Q.-X., Xu, B., Wu, Q.-H., Liao, Y., Wang, G.-Z., Fang, R.-C., Lee, H.-Y.and Lee, C.-T., Optical properties of ZnO/GaN heterostructure and its near-ultraviolet light-emitting diode,*Appl. Phys. Lett.*, 83, 4713-4715, 2003.

Yu, R. and Lam, P. K., Electronic and structural properties of MgH_2,*Phys. Rev. B*, 37, 8730, 1988.

Yue, S., Yan, Z., Shi, Y. and Ran, G., Synthesis of zinc oxide nanotubes within ultrathin anodic aluminum oxide membrane by sol-gel method,*Mater.Lett.*, 98, 246-249, 2013.

Zeng, Y. J., Ye, Z. Z., Xu, W. Z., Li, D. Y., Lu, J. G., Zhu, L. P. and Zhao, B. H., Dopant source choice for formation of p-type ZnO: Li acceptor,*Appl. Phys. Lett.*, 88, 062107-062107-3, 2006.

Zhang, H., Yang, D., Li, D., Ma, X., Li, S. and Que, D., Controllable growth of ZnO microcrystals by a capping-molecule-assisted hydrothermal process,*Cryst. Growth Des.*, 5, 547-550, 2005.

Zhang, J., Sun, L., Liao, C. and Yan, C., A simple route towards tubular ZnO,*Chem Commun*, 262-263, 2002.

Zhang, J., Zhao, S.-Q., Zhang, K., Zhou, J.-Q. and Cai, Y.-F., A study of photoluminescence properties and performance improvement of Cd-doped ZnO quantum dots prepared by the sol-gel method,*Nanoscale Res. Lett.*, 7, 405, 2012.

Zhang, S. B., Wei, S. and Zunger, A., A phenomenological model for systematization and prediction of doping limits in II-VI and I-III-VI_2 compounds,*J. Appl. Phys.*, 83, 1998.

Zhang, S. B., Wei, S.-H.and Zunger, A., Overcoming doping bottlenecks in semiconductors and wide-gap materials,*Phys. B Condens. Matter*, 273, 976-980, 1999.

Zhang, W., Xiao, S., Yang, X. and Jin, X., Broadband quantum cutting in ZnO/Yb (Er) F3 oxy-fluoride nanocomposite prepared by thermal oxidation method,*Funct. Mater.Lett.*, 6, 2013.

Zhang, Y. B., Liu, Q., Sritharan, T., Gan, C. L. and Li, S., Pulsed laser ablation of preferentially orientated ZnO: Co diluted magnetic semiconducting thin films on Si substrates,*Appl. Phys. Lett.*, 89, 042510-042510-3, 2006.

Zhang, Y., Jia, H., Luo, X., Chen, X., Yu, D. and Wang, R., Synthesis, microstructure, and growth mechanism of dendrite ZnO nanowires,*J. Phys. Chem. B*, 107, 8289-8293, 2003.

Zhang, Z., Emanetoglu, N. W., Saraf, G., Chen, Y., Wu, P., Zhong, J., Lu, Y., Chen, J., Mirochnitchenko, O. and Inouye, M., DNA immobilization and SAW response in ZnO nanotips grown on $LiNbO_3$ substrates,*Ultrason. Ferroelectr.Freq. Control IEEE Trans.On*, 53, 786-792, 2006.

Zhao, Q. X., Klason, P., Willander, M., Zhong, H. M., Lu, W. and Yang, J. H., Deep-level emissions influenced by O and Zn implantations in ZnO,*Appl. Phys. Lett.*, 87, 211912-211912-3, 2005.

Zheng, M. J., Zhang, L. D., Li, G. H. and Shen, W. Z., Fabrication and optical properties of large-scale uniform zinc oxide nanowire arrays by one-step electrochemical deposition technique,*Chem. Phys. Lett.*, 363, 123-128, 2002.

Zheng, R., Xu, L., Qin, W., Chen, J., Dong, B., Zhang, L. and Song, H., Electrospinning preparation and photoluminescence properties of $SrAl_2O_4$: Ce^{3+} nanowires,*J. Mater. Sci.*, 46, 7517-7524, 2011.

Zhong, M., Li, Y., Yamada, I. and Delaunay, J.-J., ZnO-$ZnGa_2O_4$ core-shell nanowire array for stable photoelectrochemical water splitting,*Nanoscale*, 4, 1509-1514, 2012.

Zhuang, Y., Ueda, J. and Tanabe, S., Tunable trap depth in Zn $(Ga_{1-x}Al\ x)_2O_4$: Cr, Bi red persistent phosphors: considerations of high-temperature persistent luminescence and photostimulated persistent luminescence,*J. Mater. Chem. C*, 1, 7849-7855, 2013.

Znaidi, L., Sol-gel-deposited ZnO thin films: a review,*Mater. Sci. Eng. B*, 174, 18-30, 2010.

Zuo, X., Yoon, S.-D., Yang, A., Duan, W.-H., Vittoria, C. and Harris, V. G., Ferromagnetism in pure wurtzite zinc oxide,*J. Appl. Phys.*, 105, 07C508, 2009.

Žutić, I., Fabian, J. and Sarma, S. D., Spin injection through the depletion layer: A theory of spin-polarized pn junctions and solar cells,*Phys. Rev. B*, 64, 121201, 2001.