

REFERENCES

Ahn, M.W., Park, K.S., Heo, J.H., Kim, D.W., Choi, K.J. and Park, J.G., 2009. On-chip fabrication of ZnO-nanowire gas sensor with high gas sensitivity. *Sensors and Actuators B: Chemical*, 138(1), pp.168-173.

Air Product, Allentown, PA, USA. Jul. 1999, *Methane; Material Safety Data Sheet* <http://www.avogadro.chem.iastate.edu/MSDS/methane.PDF>

Basu, S. and Basu, P.K., 2009. Nanocrystalline metal oxides for methane sensors: role of noble metals. *Journal of Sensors*, 2009.

Brattain, W.H. and Bardeen, J., 1953. Surface properties of germanium. *Bell System Technical Journal*, 32(1), pp.1-41.

Bott, B., Jones, T.A. and Mann, B., 1984. The detection and measurement of CO using ZnO single crystals. *Sensors and Actuators*, 5(1), pp.65-73.

Bochenkov, V.E. and Sergeev, G.B., 2005. Preparation and chemiresistive properties of nanostructured materials. *Advances in colloid and interface science*, 116(1-3), pp.245-254.

Barsan, N. and Weimar, U., 2001. Conduction model of metal oxide gas sensors. *Journal of Electroceramics*, 7(3), pp.143-167.

Bhattacharyya, P., Basu, P.K., Saha, H. and Basu, S., 2007. Fast response methane sensor using nanocrystalline zinc oxide thin films derived by sol-gel method. *Sensors and Actuators B: Chemical*, 124(1), pp.62-67.

Bhattacharyya, P., Basu, P.K. and Basu, S., 2010, July. Methane Detection by MIM Sensor Devices Based on Nano ZnO Thin Films Obtained by Sol-Gel and by Anodization: A Comparative Study. In *Sensor Device Technologies and Applications (SENSORDEVICES), 2010 First International Conference on* (pp. 110-115). IEEE.

Bhattacharyya, P., Basu, P.K., Lang, C., Saha, H. and Basu, S., 2008. Noble metal catalytic contacts to sol-gel nanocrystalline zinc oxide thin films for sensing methane. *Sensors and Actuators B: Chemical*, 129(2), pp.551-557.

Bhattacharyya, P., Basu, P.K., Mondal, B. and Saha, H., 2008. A low power MEMS gas sensor based on nanocrystalline ZnO thin films for sensing methane. *Microelectronics Reliability*, 48(11-12), pp.1772-1779.

Bhattacharyya, P., Verma, D. and Banerjee, D., 2010. Microcontroller based power efficient signal conditioning unit for detection of a single gas using mems based sensor. *International journal on smart sensing and intelligent systems*, 3(4), pp.771-782.

- Basu, P.K., Jana, S.K., Saha, H. and Basu, S., 2008. Low temperature methane sensing by electrochemically grown and surface modified ZnO thin films. *Sensors and Actuators B: Chemical*, 135(1), pp.81-88.
- Bhattacharyya, P., Mishra, G.P. and Sarkar, S.K., 2011. The effect of surface modification and catalytic metal contact on methane sensing performance of nano-ZnO-Si heterojunction sensor. *Microelectronics Reliability*, 51(12), pp.2185-2194.
- Barreca, D., Bekermann, D., Comini, E., Devi, A., Fischer, R.A., Gasparotto, A., Maccato, C., Sberveglieri, G. and Tondello, E., 2010. 1D ZnO nano-assemblies by Plasma-CVD as chemical sensors for flammable and toxic gases. *Sensors and Actuators B: Chemical*, 149(1), pp.1-7.
- Basyooni, M.A., Shaban, M. and El Sayed, A.M., 2017. Enhanced gas sensing properties of spin-coated Na-doped ZnO nanostructured films. *Scientific reports*, 7, p.41716.
- Baranowska-Korczyc, A., Reszka, A., Sobczak, K., Sikora, B., Dziawa, P., Aleszkiewicz, M., Kłopotowski, Ł., Paszkowicz, W., Dłużewski, P., Kowalski, B.J. and Kowalewski, T.A., 2012. Magnetic Fe doped ZnO nanofibers obtained by electrospinning. *Journal of sol-gel science and technology*, 61(3), pp.494-500.
- Boukaous, C., Benhaoua, B., Telia, A. and Ghanem, S., 2017. Effect of copper doping sol-gel ZnO thin films: physical properties and sensitivity to ethanol vapor. *Materials Research Express*, 4(10), p.105024.
- Bhardwaj, N., Pandey, A., Satpati, B., Tomar, M., Gupta, V. and Mohapatra, S., 2016. Enhanced CO gas sensing properties of Cu doped SnO₂ nanostructures prepared by a facile wet chemical method. *Physical Chemistry Chemical Physics*, 18(28), pp.18846-18854.
- Barsan, N. and Weimar, U., 2001. Conduction model of metal oxide gas sensors. *Journal of Electroceramics*, 7(3), pp.143-167.
- Capone, S., Forleo, A., Francioso, L., Rella, R., Siciliano, P., Spadavecchia, J., Presicce, D.S. and Taurino, A.M., 2003. Solid state gas sensors: state of the art and future activities. *Journal of Optoelectronics and Advanced Materials*, 5(5), pp.1335-1348.
- Cui, J., Shi, L., Xie, T., Wang, D. and Lin, Y., 2016. UV-light illumination room temperature HCHO gas-sensing mechanism of ZnO with different nanostructures. *Sensors and Actuators B: Chemical*, 227, pp.220-226.
- Choudhary, M., Mishra, V.N. and Dwivedi, R., 2013. Effect of Temperature on Palladium-Doped Tin Oxide (SnO₂) Thick Film Gas Sensor. *Advanced Science, Engineering and Medicine*, 5(9), pp.932-936.
- Comert, B., Akin, N., Donmez, M., Saglam, S. and Ozcelik, S., 2016. Titanium dioxide thin films as methane gas sensors. *IEEE Sensors Journal*, 16(24), pp.8890-8896.

Chow, L., Lupan, O., Chai, G., Khallaf, H., Ono, L.K., Cuenya, B.R., Tiginyanu, I.M., Ursaki, V.V., Sontea, V. and Schulte, A., 2013. Synthesis and characterization of Cu-doped ZnO one-dimensional structures for miniaturized sensor applications with faster response. *Sensors and Actuators A: Physical* 189, pp. 399-408.

Cerda, J., Arbiol, J., Diaz, R., Dezanneau, G. and Morante, J.R., 2002. Synthesis of perovskite-type BaSnO₃ particles obtained by a new simple wet chemical route based on a sol-gel process. *Materials Letters*, 56(3), pp.131-136.

D'amico, A. and Sberveglieri, G., 1995. Sensors for Domestic Applications: Proceedings of the First European School on Sensors (ESS'94). In *Sensors for Domestic Applications: Proceedings of the First European School on Sensors (ESS'94)* (pp. 1-274).

Drafts, B., 2001. Acoustic wave technology sensors. *IEEE Transactions on microwave theory and techniques*, 49(4), pp.795-802.

Fergus, J.W., 2007. Perovskite oxides for semiconductor-based gas sensors. *Sensors and Actuators B: Chemical*, 123(2), pp.1169-1179.

Fu, C.C., Grimes, A., Long, M., Ferri, C.G., Rich, B.D., Ghosh, S., Ghosh, S., Lee, L.P., Gopinathan, A. and Khine, M., 2009. Tunable nanowrinkles on shape memory polymer sheets. *Advanced Materials*, 21(44), pp.4472-4476.

Gu, H., Wang, Z. and Hu, Y., 2012. Hydrogen gas sensors based on semiconductor oxide nanostructures. *Sensors*, 12(5), pp.5517-5550.

Ghosh, S., Adak, D., Bhattacharyya, R. and Mukherjee, N., 2017. ZnO/ γ -Fe₂O₃ Charge Transfer Interface toward Highly Selective H₂S Sensing at a Low Operating Temperature of 30° C. *ACS sensors*, 2(12), pp.1831-1838.

Ghosh, S., RoyChaudhuri, C., Bhattacharya, R., Saha, H. and Mukherjee, N., 2014. Palladium-silver-activated ZnO surface: highly selective methane sensor at reasonably low operating temperature. *ACS applied materials & interfaces*, 6(6), pp.3879-3887.

Gao, F., Liu, X.Y., Zheng, L.Y., Li, M.X., Bai, Y.M. and Xie, J., 2013. Microstructure and optical properties of Fe-doped ZnO thin films prepared by DC magnetron sputtering. *Journal of Crystal Growth*, 371, pp.126-129.

Greco, F., Ventrelli, L., Dario, P., Mazzolai, B. and Mattoli, V., 2012. Micro-wrinkled palladium surface for hydrogen sensing and switched detection of lower flammability limit. *international journal of hydrogen energy*, 37(22), pp.17529-17539.

Guo, J., Zhang, J., Zhu, M., Ju, D., Xu, H. and Cao, B., 2014. High-performance gas sensor based on ZnO nanowires functionalized by Au nanoparticles. *Sensors and Actuators B: Chemical*, 199, pp.339-345.

- Ganguli, A.K., Ganguly, A. and Basu, M., 2013. Nanoscience research in India: Recent contributions (2012–2013). In *Nanoscience* (pp. 139-203).
- Ghosh, A., Kumari, N. and Bhattacharjee, A., 2015. Influence of Cu doping on the structural, electrical and optical properties of ZnO. *Pramana*, 84(4), pp.621-635.
- Gong, H., Hu, J.Q., Wang, J.H., Ong, C.H. and Zhu, F.R., 2006. Nano-crystalline Cu-doped ZnO thin film gas sensor for CO. *Sensors and Actuators B: Chemical*, 115(1), pp.247-251.
- Guo, Z., Chen, G., Zeng, G., Liu, L. and Zhang, C., 2015. Metal oxides and metal salt nanostructures for hydrogen sulfide sensing: mechanism and sensing performance. *RSC Advances*, 5(67), pp.54793-54805.
- Gupta, T.K., 1990. Application of zinc oxide varistors. *Journal of the American Ceramic Society*, 73(7), pp.1817-1840.
- Moezzi, A., McDonagh, A.M. and Cortie, M.B., 2012. Zinc oxide particles: Synthesis, properties and applications. *Chemical engineering journal*, 185, pp.1-22.
- Gruber, D., Kraus, F. and Müller, J., 2003. A novel gas sensor design based on CH₄/H₂/H₂O plasma etched ZnO thin films. *Sensors and Actuators B: Chemical*, 92(1-2), pp.81-89.
- Hill, R.H. and Finster, D.C., 2016. *Laboratory safety for chemistry students*. John Wiley & Sons. (book)
- Hulanicki, A., Glab, S. and Ingman, F.O.L.K.E., 1991. Chemical sensors: definitions and classification. *Pure and Applied Chemistry*, 63(9), pp.1247-1250.
- Hur, T.B., Jeen, G.S., Hwang, Y.H. and Kim, H.K., 2003. Photoluminescence of polycrystalline ZnO under different annealing conditions. *Journal of applied physics*, 94(9), pp.5787-5790.
- Heiland, G., 1981. Homogeneous semiconducting gas sensors. *Sensors and Actuators*, 2, pp.343-361.
- Heiland, G., Mollwo, E. and Stöckmann, F., 1959. Electronic processes in zinc oxide. In *Solid state physics* (Vol. 8, pp. 191-323). Academic Press.
- Holland, B.T., Blanford, C.F., Do, T. and Stein, A., 1999. Synthesis of highly ordered, three-dimensional, macroporous structures of amorphous or crystalline inorganic oxides, phosphates, and hybrid composites. *Chemistry of Materials*, 11(3), pp.795-805.
- Hu, J., Gao, F., Zhao, Z., Sang, S., Li, P., Zhang, W., Zhou, X. and Chen, Y., 2016. Synthesis and characterization of Cobalt-doped ZnO microstructures for methane gas sensing. *Applied Surface Science*, 363, pp.181-188.
- Hassan, J.J., Mahdi, M.A., Chin, C.W., Abu-Hassan, H. and Hassan, Z., 2013. A high-sensitivity room-temperature hydrogen gas sensor based on oblique and vertical ZnO nanorod arrays. *Sensors and Actuators B: Chemical*, 176, pp.360-367.

Horzum, S., Torun, E., Serin, T. and Peeters, F.M., 2016. Structural, electronic and optical properties of Cu-doped ZnO: experimental and theoretical investigation. *Philosophical Magazine*, 96(17), pp.1743-1756.

Jardine, A.P., 2000. Hydrogen sensors for hydrogen fuel cell applications. *DCH Technology Inc*, pp.1-7

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

Jones, A., Jones, T.A., Mann, B. and Firth, J.G., 1984. The effect of the physical form of the oxide on the conductivity changes produced by CH₄, CO and H₂O on ZnO. *Sensors and Actuators*, 5(1), pp.75-88.

Jayatissa, A.H., Samarasekara, P. and Kun, G., 2009. Methane gas sensor application of cuprous oxide synthesized by thermal oxidation. *physica status solidi (a)*, 206(2), pp.332-337.

Kumar, R., Al-Dossary, O., Kumar, G. and Umar, A., 2015. Zinc oxide nanostructures for NO₂ gas-sensor applications: A review. *Nano-Micro Letters*, 7(2), pp.97-120.

Kumar, M., Bhati, V.S., Ranwa, S. and Singh, J., 2017. Pd/ZnO nanorods based sensor for highly selective detection of extremely low concentration hydrogen. *Scientific reports*, 7(1), p.236.

Katoch, A., Choi, S.W., Kim, H.W. and Kim, S.S., 2015. Highly sensitive and selective H₂ sensing by ZnO nanofibers and the underlying sensing mechanism. *Journal of hazardous materials*, 286, pp.229-235.

Lampe, U., Gerblinger, J. and Meixner, H., 1995. Carbon-monoxide sensors based on thin films of BaSnO₃. *Sensors and Actuators B: Chemical*, 25(1-3), pp.657-660.

Lv, Y., Guo, L., Xu, H. and Chu, X., 2007. Gas-sensing properties of well-crystalline ZnO nanorods grown by a simple route. *Physica E: Low-dimensional Systems and Nanostructures*, 36(1), pp.102-105.

Morey, G.W., 1931. Glass, its composition and properties. *Journal of Chemical Education*, 8(3), p.421. (journal)

Morey, G.W., 1938. *Properties of glass*. Reinhold Publishing Corporation; New York. (book)

Makishima, A. and Mackenzie, J.D., 1976. Calculation of thermal expansion coefficient of glasses. *Journal of Non-Crystalline Solids*, 22(2), pp.305-313. (journal)

Mazurin, O.V. and Prokhorenko, O.A., 2005. 10 Electrical Conductivity of Glass Melts. *Properties of glass-forming melts*, p.295. (book)

Moseley, P.T., 1997. Solid state gas sensors. *Measurement Science and technology*, 8(3), p.223.

Moseley, P.T. and Norris, J.O., 1991. *Techniques and mechanisms in gas sensing*. Taylor & Francis

Moseley, Pat T., and John Crocker. *Sensor materials*. CRC Press, 1996.

Moseley, P.T., 1992. Materials selection for semiconductor gas sensors. *Sensors and Actuators B: Chemical*, 6(1-3), pp.149-156.

Mosahebfard, A., Jahromi, H.D. and Sheikhi, M.H., 2016. Highly sensitive, room temperature methane gas sensor based on lead sulfide colloidal nanocrystals. *IEEE Sensors Journal*, 16(11), pp.4174-4179.

Mosahebfard, A., Roshan, H. and Sheikhi, M.H., 2017. Enhancement of methane gas sensing characteristics of lead sulfide colloidal nanocrystals by silver nanoparticles decoration. *IEEE Sensors Journal*, 17(11), pp.3375-3380.

Mandelis, A. and Christofides, C., 1993. *Physics, chemistry and technology of solid state gas sensor devices* (Vol. 174). John Wiley & Sons.

Martinelli, G. and Carotta, M.C., 1995. Thick-film gas sensors. *Sensors and Actuators B: Chemical*, 23(2-3), pp.157-161.

Mani, G.K. and Rayappan, J.B.B., 2013. A highly selective room temperature ammonia sensor using spray deposited zinc oxide thin film. *Sensors and Actuators B: Chemical*, 183, pp.459-466.

Mani, G.K. and Rayappan, J.B.B., 2015. A highly selective and wide range ammonia sensor—Nanostructured ZnO: Co thin film. *Materials Science and Engineering: B*, 191, pp.41-50.

Mitra, P. and Mukhopadhyay, A.K., 2007. ZnO thin film as methane sensor. *Bulletin of the Polish Academy of Sciences-Technical Sciences*, 55(3), pp.281-285.

Motaung, D.E., Mhlongo, G.H., Kortidis, I., Nkosi, S.S., Malgas, G.F., Mwakikunga, B.W., Ray, S.S. and Kiriakidis, G., 2013. Structural and optical properties of ZnO nanostructures grown by aerosol spray pyrolysis: Candidates for room temperature methane and hydrogen gas sensing. *Applied Surface Science*, 279, pp.142-149.

Maccauro, G., Iommetti, P.R., Raffaelli, L. and Manicone, P.F., 2011. Alumina and zirconia ceramic for orthopaedic and dental devices. In *Biomaterials applications for nanomedicine*. InTech.

Mallikarjunachari, G. and Ghosh, P., 2017. Application of nanomechanical response of wrinkled thin films in surface feature generation. *European Polymer Journal*, 89, pp.524-538.

Malik, R.K., Khanna, R., Sharma, G.L., Pavunny, S.P. and Katiyar, R.S., 2015. Hydrogen Sensing Properties of Copper-Doped Zinc Oxide Thin Films. *IEEE Sensors Journal*, 15(12), pp.7021-7028.

Misra, S.K. and Pandey, N.K., 2016. Study of activation energy and humidity sensing application of nanostructured Cu-doped ZnO thin films. *Journal of Materials Research*, 31(20), pp.3214-3222.

Morrison, S.R., 1981. Semiconductor gas sensors. *Sensors and Actuators*, 2, pp.329-341.

Norton, D.P., Heo, Y.W., Ivill, M.P., Ip, K., Pearton, S.J., Chisholm, M.F. and Steiner, T., 2004. ZnO: growth, doping & processing. *Materials today*, 7(6), pp.34-40.

Ogawa, H., Nishikawa, M. and Abe, A., 1982. Hall measurement studies and an electrical conduction model of tin oxide ultrafine particle films. *Journal of Applied Physics*, 53(6), pp.4448-4455.

Panchapakesan, B., Cavicchi, R., Semancik, S. and DeVoe, D.L., 2005. Sensitivity, selectivity and stability of tin oxide nanostructures on large area arrays of microhotplates. *Nanotechnology*, 17(2), p.415.

Pati, S., Maity, A., Banerji, P. and Majumder, S.B., 2014. Qualitative and quantitative differentiation of gases using ZnO thin film gas sensors and pattern recognition analysis. *Analyst*, 139(7), pp.1796-1800.

Rothschild, A. and Komem, Y., 2004. On the relationship between the grain size and gas-sensitivity of chemo-resistive metal-oxide gas sensors with nanosized grains. *Journal of electroceramics*, 13(1-3), pp.697-701.

Rothschild, A. and Komem, Y., 2004. The effect of grain size on the sensitivity of nanocrystalline metal-oxide gas sensors. *Journal of Applied Physics*, 95(11), pp.6374-6380.

Rambu, A.P., Iftimie, N. and Nica, V., 2012. Effect of In incorporation on the structural, electrical, and gas sensing properties of ZnO films. *Journal of Materials Science*, 47(19), pp.6979-6985.

Rambu, A.P., Iftimie, N., Nica, V., Dobromir, M. and Tascu, S., 2015. Efficient methane detection by Co doping of ZnO thin films. *Superlattices and Microstructures*, 78, pp.61-70.

Rambu, A.P., Doroftei, C., Ursu, L. and Iacomi, F., 2013. Structure and gas sensing properties of nanocrystalline Fe-doped ZnO films prepared by spin coating method. *Journal of Materials Science*, 48(12), pp.4305-4312.

Rahman, M.M., Jamal, A., Khan, S.B. and Faisal, M., 2011. CuO codoped ZnO based nanostructured materials for sensitive chemical sensor applications. *ACS applied materials & interfaces*, 3(4), pp.1346-1351.

Rao, C.N.R. and Govindaraj, A., 2005. Nanotubes and nanowires, RSC nanoscience & nanotechnology series.

Rout, C.S., Krishna, S.H., Vivekchand, S.R.C., Govindaraj, A. and Rao, C.N.R., 2006. Hydrogen and ethanol sensors based on ZnO nanorods, nanowires and nanotubes. *Chemical Physics Letters*, 418(4-6), pp.586-590.

Reddy, C.G., Manorama, S.V. and Rao, V.J., 1999. Semiconducting gas sensor for chlorine based on inverse spinel nickel ferrite. *Sensors and Actuators B: Chemical*, 55(1), pp.90-95.

Reddy, C.G., Manorama, S.V. and Rao, V.J., 2000. Preparation and characterization of ferrites as gas sensor materials. *Journal of materials science letters*, 19(9), pp.775-778.

Ruisong, G., Duoli, G., Haitao, O., Yuru, C., Zhengfang, Y. and Qiming, Y., 2002. Effects of Adding Rare Earth Oxides on Properties of Zirconia-Toughened Alumina Ceramics. *journal-chinese ceramic society*, 30(1), pp.112-116.

Spence, W.P. and Kultermann, E., 2016. *Construction materials, methods and techniques*. Cengage Learning. (book)

Seiyama, T., Kato, A., Fujiishi, K. and Nagatani, M., 1962. A new detector for gaseous components using semiconductive thin films. *Analytical Chemistry*, 34(11), pp.1502-1503.

Sotter, E. and Vilanova, X., 2006. Development of a thick film gas sensor for oxygen detection at trace levels. *PhD Theses, University of Rovira and Virgili*.

Sze, S.M. ed., 1994. *Semiconductor sensors* (Vol. 55). New York: Wiley.

Sears, W.M., 2000. The effect of oxygen stoichiometry on the humidity sensing characteristics of bismuth iron molybdate. *Sensors and Actuators B: Chemical*, 67(1-2), pp.161-172.

Scott, R.W., Yang, S.M., Chabanis, G., Coombs, N., Williams, D.E. and Ozin, G.A., 2001. Tin Dioxide Opals and Inverted Opals: Near-Ideal Microstructures for Gas Sensors. *Advanced Materials*, 13(19), pp.1468-1472.

Sharma, S. and Madou, M., 2012. A new approach to gas sensing with nanotechnology. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 370(1967), pp.2448-2473.

Sarkar, A., Maity, S., Bhunia, C.T. and Sahu, P.P., 2017. Responsivity optimization of methane gas sensor through the modification of hexagonal nanorod and reduction of defect states. *Superlattices and Microstructures*, 102, pp.459-469.

- Srivastava, A., Kumar, N. and Khare, S., 2014. Enhancement in UV emission and band gap by Fe doping in ZnO thin films. *Opto-Electronics Review*, 22(1), pp.68-76.
- Singh, K., Devi, V., Dhar, R. and Mohan, D., 2015. Structural, optical and electronic properties of Fe doped ZnO thin films. *Superlattices and Microstructures*, 85, pp.433-437.
- Takata, M., Tsubone, D. and Yanagida, H., 1976. Dependence of electrical conductivity of ZnO on degree of sintering. *Journal of the American Ceramic Society*, 59(1-2), pp.4-8.
- Tiemann, M., 2007. Porous metal oxides as gas sensors. *Chemistry—A European Journal*, 13(30), pp.8376-8388.
- Tai, H., Yuan, Z., Zheng, W., Ye, Z., Liu, C. and Du, X., 2016. ZnO nanoparticles/reduced graphene oxide bilayer thin films for improved NH₃-sensing performances at room temperature. *Nanoscale research letters*, 11(1), p.130.
- Teimoori, F., Khojier, K. and Dehnavi, N.Z., 2016. Investigation on the electrical and methane gas-sensing properties of ZnO thin films produced by different methods. *Journal of Electronic Materials*, 45(10), pp.4881-4889.
- United Nations. Economic Commission for Europe and Methane to Markets Partnership, 2010. *Best practice guidance for effective methane drainage and use in coal mines* (No. 31). United Nations Publications.
- Vivekchand, S.R.C., Gundiah, G., Govindaraj, A. and Rao, C.N.R., 2004. A new method for the preparation of metal nanowires by the nebulized spray pyrolysis of precursors. *Advanced Materials*, 16(20), pp.1842-1845.
- Vyas, R., Sharma, S., Khan, S., Divakar, R., Sachdev, K. and Sharma, S.K., 2015, November. Comparative Study of Fe-Doped ZnO Nanowire Bundle and Their Thin Film for NO₂ and CH₄ Gas Sensing. In *Macromolecular Symposia* (Vol. 357, No. 1, pp. 99-104).
- Wilson, D.M., Hoyt, S., Janata, J., Booksh, K. and Obando, L., 2001. Chemical sensors for portable, handheld field instruments. *IEEE Sensors Journal*, 1(4), pp.256-274.
- White, R.M., Wicher, P.J., Wenzel, S.W. and Zellers, E.T., 1987. Plate-mode ultrasonic oscillator sensors. *IEEE transactions on ultrasonics, ferroelectrics, and frequency control*, 34(2), pp.162-171.
- Wang, Z.L., 2004. Zinc oxide nanostructures: growth, properties and applications. *Journal of physics: condensed matter*, 16(25), p.R829.
- Wang, L., Kang, Y., Liu, X., Zhang, S., Huang, W. and Wang, S., 2012. ZnO nanorod gas sensor for ethanol detection. *Sensors and Actuators B: Chemical*, 162(1), pp.237-243.

Wei, A., Pan, L. and Huang, W., 2011. Recent progress in the ZnO nanostructure-based sensors. *Materials Science and Engineering: B*, 176(18), pp.1409-1421.

Wu, Z., Chen, X., Zhu, S., Zhou, Z., Yao, Y., Quan, W. and Liu, B., 2013. Enhanced sensitivity of ammonia sensor using graphene/polyaniline nanocomposite. *Sensors and Actuators B: Chemical*, 178, pp.485-493.

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Xu, Y., Zhou, X. and Sorensen, O.T., 2000. Oxygen sensors based on semiconducting metal oxides: an overview. *Sensors and Actuators B: Chemical*, 65(1-3), pp.2-4.

Xie, J., Han, X., Ji, H., Wang, J., Zhao, J. and Lu, C., 2016. Self-Supported Crack-Free Conducting Polymer Films with Stabilized Wrinkling Patterns and Their Applications. *Scientific reports*, 6, p.36686.

Yin, M., Liu, M. and Liu, S., 2014. Diameter regulated ZnO nanorod synthesis and its application in gas sensor optimization. *Journal of Alloys and Compounds*, 586, pp.436-440.

Zhu, L. and Zeng, W., 2017. Room-temperature gas sensing of ZnO-based gas sensor: A review. *Sensors and Actuators A: Physical*, 267, pp.242-261.

Zhang, Z., Li, X., Wang, C., Wei, L., Liu, Y. and Shao, C., 2009. ZnO hollow nanofibers: fabrication from facile single capillary electrospinning and applications in gas sensors. *The Journal of Physical Chemistry C*, 113(45), pp.19397-19403.