

References

- Acar, M. A., (2009), "Fabrication, modeling, and characterization of GaN HEMTs, and design of high power MMIC amplifiers", Department of Electrical and Electronics Engineering, Institute of Engineering and Sciences, Bilkent University, Turkey.
- Ai, K., Ruan, C., Shen, M., and Lu, L., (2016), "MoS₂ Nanosheets with Widened Interlayer Spacing for High-Efficiency Removal of Mercury in Aquatic Systems", *Advanced Functional Materials* Vol. 26, pp. 5542-5549.
- Aliakbar Tehrani, Z., Jamshidi, Z., Jebeli Javan, M., and Fattahi, A., (2012), "Interactions of Glutathione Tripeptide with Gold Cluster: Influence of Intramolecular Hydrogen Bond on Complexation Behavior", *The Journal of Physical Chemistry A* Vol. 116, pp. 4338-4347.
- Amano, H., Kitoh, M., Hiramatsu, K., and Akasaki, I., (1990), "Growth and Luminescence Properties of Mg-Doped GaN Prepared by MOVPE", *Journal of The Electrochemical Society* Vol. 137, pp. 1639.
- Ambacher, O., Dimitrov, R., Stutzmann, M., Foutz, B. E., Murphy, M. J., Smart, J. A., Shealy, J. R., Weimann, N. G., Chu, K., Chumbes, M., Green, B., Sierakowski, A. J., Schaff, W. J., and Eastman, L. F., (1999a), "Role of Spontaneous and Piezoelectric Polarization Induced Effects in Group-III Nitride Based Heterostructures and Devices", *physica status solidi (b)* Vol. 216, pp. 381-389.
- Ambacher, O., Majewski, J., Miskys, C., Link, A., Hermann, M., Eickhoff, M., Stutzmann, M., Bernardini, F., Fiorentini, V., Tilak, V., Schaff, B., and Eastman, L. F., (2002), "Pyroelectric properties of Al(In)GaN/GaN hetero- and quantum well structures", *Journal of Physics: Condensed Matter* Vol. 14, pp. 3399-3434.
- Ambacher, O., Smart, J., Shealy, J. R., Weimann, N. G., Chu, K., Murphy, M., Schaff, W. J., Eastman, L. F., Dimitrov, R., Wittmer, L., Stutzmann, M., Rieger, W., and Hilsenbeck, J., (1999b), "Two-dimensional electron gases induced by spontaneous and piezoelectric polarization charges in N- and Ga-face AlGaIn/GaN heterostructures", *Journal of Applied Physics* Vol. 85, pp. 3222-3233.
- Ao, J.-P., Wang, T., Kikuta, D., Liu, Y.-H., Sakai, S., and Ohno, Y., (2003), "AlGaIn/GaN High Electron Mobility Transistor with Thin Buffer Layers", *Japanese Journal of Applied Physics* Vol. 42, pp. 1588-1589.
- Aragay, G., Pons, J., and Merkoçi, A., (2011), "Recent Trends in Macro-, Micro-, and Nanomaterial-Based Tools and Strategies for Heavy-Metal Detection", *Chemical Reviews* Vol. 111, pp. 3433-3458.
- Arduini, F., Majorani, C., Amine, A., Moscone, D., and Palleschi, G., (2011), "Hg²⁺ detection by measuring thiol groups with a highly sensitive screen-printed electrode modified with a nanostructured carbon black film", *Electrochimica Acta* Vol. 56, pp. 4209-4215.
- Ariño, C., Serrano, N., Díaz-Cruz, J. M., and Esteban, M., (2017), "Voltammetric determination of metal ions beyond mercury electrodes. A review", *Analytica Chimica Acta* Vol. 990, pp. 11-53.
- Arora, N. D., Hauser, J. R., and Roulston, D. J., (1982), "Electron and hole mobilities in silicon as a function of concentration and temperature", *IEEE Transactions on Electron Devices* Vol. 29, pp. 292-295.
- Asadnia, M., Myers, M., Akhavan, N. D., O'Donnell, K., Umana-Membreno, G. A., Mishra, U. K., Nener, B., Baker, M., and Parish, G., (2016), "Mercury(II) selective sensors based on AlGaIn/GaN transistors", *Analytica Chimica Acta* Vol. 943, pp. 1-7.
- Aswathi, R., and Sandhya, K. Y., (2018), "Ultrasensitive and selective electrochemical sensing of Hg(II) ions in normal and sea water using solvent exfoliated MoS₂: affinity matters", *Journal of Materials Chemistry A* Vol. 6, pp. 14602-14613.

- Bajaj, S., Shoron, O. F., Park, P. S., Krishnamoorthy, S., Akyol, F., Hung, T.-H., Reza, S., Chumbes, E. M., Khurgin, J., and Rajan, S., (2015), "Density-dependent electron transport and precise modeling of GaN high electron mobility transistors", *Applied Physics Letters* Vol. 107, pp. 153504.
- Balaz, D., (2011), "Current collapse and device degradation in AlGaN/GaN heterostructure field effect transistors", Ph.D Thesis, Department of Electronics & Electrical Engineering, University of Glasgow, Glasgow.
- Bansod, B., Kumar, T., Thakur, R., Rana, S., and Singh, I., (2017), "A review on various electrochemical techniques for heavy metal ions detection with different sensing platforms", *Biosensors and Bioelectronics* Vol. 94, pp. 443-455.
- Bard, A. J., Faulkner, L. R., Leddy, J., and Zoski, C. G., (1980), *Electrochemical methods: fundamentals and applications*, Ed., 2, Wiley New York,
- Bergveld, P., (2003), "Thirty years of ISFETOLOGY: What happened in the past 30 years and what may happen in the next 30 years", *Sensors and Actuators B: Chemical* Vol. 88, pp. 1-20.
- Bernardini, F., (2007), "Spontaneous and Piezoelectric Polarization: Basic Theory vs. Practical Recipes", *Nitride Semiconductor Devices: Principles and Simulation*, Edited by J. Piprek, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, pp. 49-67, 2007.
- Bettini, S., Pagano, R., Valli, L., and Giancane, G., (2014), "Spectroscopic Investigation of the Selective Interaction of Mercuric and Cupric Ions with a Porphyrin Active Layer", *The Journal of Physical Chemistry C* Vol. 118, pp. 12384-12390.
- Bhat, T. N., Dolmanan, S. B., Dikme, Y., Tan, H. R., Bera, L. K., and Tripathy, S., (2014), "Structural and optical properties of Al_xGa_{1-x}N/GaN high electron mobility transistor structures grown on 200 mm diameter Si(111) substrates", *Journal of Vacuum Science & Technology B* Vol. 32, pp. 021206.
- Bhat, T. N., Rajpalke, M. K., Roul, B., Kumar, M., and Krupanidhi, S. B., (2011), "Substrate nitridation induced modulations in transport properties of wurtzite GaN/p-Si (100) heterojunctions grown by molecular beam epitaxy", *Journal of Applied Physics* Vol. 110, pp. 093718.
- Boulay, S., Touati, S., Sar, A. A., Hoel, V., Gaquiere, C., Jaeger, J. C. D., Joblot, S., Cordier, Y., Semond, F., and Massies, J., (2007), "AlGaIn/GaN HEMTs on a (001)-Oriented Silicon Substrate Based on 100-nm SiN Recessed Gate Technology for Microwave Power Amplification", *IEEE Transactions on Electron Devices* Vol. 54, pp. 2843-2848.
- Butt, H. J., and Kappl, M., (2018), *Surface and interfacial forces*, Ed., 2, John Wiley & Sons.
- Carolin, C. F., Kumar, P. S., Saravanan, A., Joshiba, G. J., and Naushad, M., (2017), "Efficient techniques for the removal of toxic heavy metals from aquatic environment: A review", *Journal of Environmental Chemical Engineering* Vol. 5, pp. 2782-2799.
- Chai, F., Wang, C., Wang, T., Li, L., and Su, Z., (2010), "Colorimetric Detection of Pb²⁺ Using Glutathione Functionalized Gold Nanoparticles", *ACS Applied Materials & Interfaces* Vol. 2, pp. 1466-1470.
- Chang, Y.-H., Lu, Y.-S., Yeh, J. A., Hong, Y.-L., Lee, H.-M., and Gwo, S., (2011), *Semiconductor Device-Based Sensors for Gas, Chemical, and Bio Applications*, Ed., 1, CRC Press, Taylor & Francis Group Boca Raton, FL, USA,
- Charfeddine, M., Belmabrouk, H., Zaidi, M. A., and Maaref, H., (2012), "2-D Theoretical Model for Current-Voltage Characteristics in AlGaIn/GaN HEMT's", *Journal of Modern Physics* Vol. 03, pp. 881-886.
- Chattopadhyaya, M. K., and Tokekar, S., (2008), "Thermal model for dc characteristics of algan/gan hemts including self-heating effect and non-linear polarization", *Microelectronics Journal* Vol. 39, pp. 1181-1188.
- Chen, K., Lu, G., Chang, J., Mao, S., Yu, K., Cui, S., and Chen, J., (2012a), "Hg(II) Ion Detection Using Thermally Reduced Graphene Oxide Decorated with Functionalized Gold Nanoparticles", *Analytical Chemistry* Vol. 84, pp. 4057-4062.
- Chen, K. H., Wang, H. W., Kang, B. S., Chang, C. Y., Wang, Y. L., Lele, T. P., Ren, F., Pearton, S. J., Dabiran, A., Osinsky, A., and Chow, P. P., (2008), "Low Hg(II) ion concentration electrical

- detection with AlGaIn/GaN high electron mobility transistors", *Sensors and Actuators B: Chemical* Vol. 134, pp. 386-389.
- Chen, Y.-T., Sarangadharan, I., Sukesan, R., Hseih, C.-Y., Lee, G.-Y., Chyi, J.-I., and Wang, Y.-L., (2018), "High-field modulated ion-selective field-effect-transistor (FET) sensors with sensitivity higher than the ideal Nernst sensitivity", *Scientific Reports* Vol. 8, pp. 1-8.
- Chen, Y., Wu, L., Chen, Y., Bi, N., Zheng, X., Qi, H., Qin, M., Liao, X., Zhang, H., and Tian, Y., (2012b), "Determination of mercury(II) by surface-enhanced Raman scattering spectroscopy based on thiol-functionalized silver nanoparticles", *Microchimica Acta* Vol. 177, pp. 341-348.
- Cheng, X., Li, M., and Wang, Y., (2010), "An analytical model for current-voltage characteristics of AlGaIn/GaN HEMTs in presence of self-heating effect", *Solid-State Electronics* Vol. 54, pp. 42-47.
- Cho, S.-Y., Kim, S. J., Lee, Y., Kim, J.-S., Jung, W.-B., Yoo, H.-W., Kim, J., and Jung, H.-T., (2015), "Highly Enhanced Gas Adsorption Properties in Vertically Aligned MoS₂ Layers", *ACS Nano* Vol. 9, pp. 9314-9321.
- Cho, Y., Lee, S. S., and Jung, J. H., (2010), "Recyclable fluorimetric and colorimetric mercury-specific sensor using porphyrin-functionalized Au@SiO₂ core/shell nanoparticles", *Analyst* Vol. 135, pp. 1551-1555.
- Chow, E., Hibbert, D. B., and Gooding, J. J., (2005), "Voltammetric detection of cadmium ions at glutathione-modified gold electrodes", *Analyst* Vol. 130, pp. 831-837.
- Chu, B.-H., Chang, C., L. Wang, Y., J. Pearton, S., and Ren, F., (2010a), *Surface Immobilizations of AlGaIn/GaN High Electron Mobility Transistor Based Sensors*, Ed., 33, pp. 3-22.
- Chu, B. H., Chang, C. Y., Wang, Y. L., Pearton, S. J., and Ren, F., (2010b), "Surface Immobilizations of AlGaIn/GaN High Electron Mobility Transistor Based Sensors", *ECS Transactions* Vol. 33, pp. 3-22.
- Cimalla, I., Gebinoga, M., Schober, A., Polyakov, V., Lebedev, V., and Cimalla, V., (2011), *AlGaIn/GaN Sensors for Direct Monitoring of Nerve Cell Response to Inhibitors* Ed., 1, CRC Press, Taylor & Francis Group Boca Raton, FL, USA,
- Cimalla, V., (2018), "Label-Free Biosensors Based on III-Nitride Semiconductors", *Label-Free Biosensing: Advanced Materials, Devices and Applications*, Edited by M. J. Schöning and A. Poghossian, Springer International Publishing, pp. 59-102, 2018.
- Cullity, B. D., (2018), *Elements of X Ray Diffraction*, Second Ed., FRANKLIN CLASSICS TRADE Press.
- CWC, D., (2019), "Status of trace & toxic metals in Indian rivers (R. D. a. G. R. Department of Water Resources, ed.), pp. 1-259. Ministry of Jal Shakti, Ministry of Jal Shakti, New Delhi.
- Díaz-Cruz, M. S., Mendieta, J., Tauler, R., and Esteban, M., (1997), "Cadmium-binding properties of glutathione: A chemometrical analysis of voltammetric data", *Journal of Inorganic Biochemistry* Vol. 66, pp. 29-36.
- Díaz-Cruz, M. S., Mendieta, J., Tauler, R., and Esteban, M., (1999), "Multivariate Curve Resolution of Cyclic Voltammetric Data: Application to the Study of the Cadmium-Binding Properties of Glutathione", *Analytical Chemistry* Vol. 71, pp. 4629-4636.
- Ding, Y., Shen, S. Z., Sun, H., Sun, K., and Liu, F., (2014), "Synthesis of l-glutathione-capped-ZnSe quantum dots for the sensitive and selective determination of copper ion in aqueous solutions", *Sensors and Actuators B: Chemical* Vol. 203, pp. 35-43.
- Directorate, R. D., (2014), *Status of Trace and Toxic Metals in Indian Rivers*, Ministry of Water Resources, Central Water Commission, Government of India, New Delhi, 2014
- Dong, Y., Son, D.-h., Dai, Q., Lee, J.-H., Won, C.-H., Kim, J.-G., Kang, S.-H., Lee, J.-H., Chen, D., Lu, H., Zhang, R., and Zheng, Y., (2018), "AlGaIn/GaN heterostructure pH sensor with multi-sensing segments", *Sensors and Actuators B: Chemical* Vol. 260, pp. 134-139.
- Dong, Y., Zhou, Y., Ding, Y., Chu, X., and Wang, C., (2014), "Sensitive detection of Pb(II) at gold nanoparticle/polyaniline/graphene modified electrode using differential pulse anodic stripping voltammetry", *Analytical Methods* Vol. 6, pp. 9367-9374.
- Downes, A., and Elfick, A., (2010), "Raman Spectroscopy and Related Techniques in Biomedicine", *Sensors* Vol. 10, pp. 1871-1889.

- Eickhoff, M., Neuberger, R., Steinhoff, G., Ambacher, O., Müller, G., and Stutzmann, M., (2001), "Wetting Behaviour of GaN Surfaces with Ga- or N-Face Polarity", *physica status solidi (b)* Vol. 228, pp. 519-522.
- Ensafi, A. A., Meghdadi, S., and Sedighi, S., (2009), "Sensitive cadmium potentiometric sensor based on 4-hydroxy salophen as a fast tool for water samples analysis", *Desalination* Vol. 242, pp. 336-345.
- Esposito, M., (2018), "Fundamental Modeling and Simulation of AlGaIn/GaN High Electron Mobility Transistor pH Sensing Technologies", PhD, The Graduate School of The University of Florida, University of Florida, Florida.
- Feng, G., Wei, A., Zhao, Y., and Liu, J., (2015), "Synthesis of flower-like MoS₂ nanosheets microspheres by hydrothermal method", *Journal of Materials Science: Materials in Electronics* Vol. 26, pp. 8160-8166.
- Gan, X., Zhao, H., and Quan, X., (2017), "Two-dimensional MoS₂: A promising building block for biosensors", *Biosensors and Bioelectronics* Vol. 89, pp. 56-71.
- Gao, X., Dai, J., Zhao, H., Zhu, J., Luo, L., Zhang, R., Zhang, Z., and Li, L., (2018), "Synthesis of MoS₂ nanosheets for mercury speciation analysis by HPLC-UV-HG-AFS", *RSC Advances* Vol. 8, pp. 18364-18371.
- Goel, N., Kumar, R., Hojamberdiev, M., and Kumar, M., (2018), "Enhanced Carrier Density in a MoS₂/Si Heterojunction-Based Photodetector by Inverse Auger Process", *IEEE Transactions on Electron Devices* Vol. 65, pp. 4149-4154.
- Gong, J., Zhou, T., Song, D., Zhang, L., and Hu, X., (2010), "Stripping Voltammetric Detection of Mercury(II) Based on a Bimetallic Au-Pt Inorganic-Organic Hybrid Nanocomposite Modified Glassy Carbon Electrode", *Analytical Chemistry* Vol. 82, pp. 567-573.
- Grundler, P., (2006), *Chemical Sensors: An Introduction for Scientists and Engineers*, Ed., Springer Berlin pp. 1-273.
- Güell, R., Aragay, G., Fontàs, C., Anticó, E., and Merkoçi, A., (2008), "Sensitive and stable monitoring of lead and cadmium in seawater using screen-printed electrode and electrochemical stripping analysis", *Analytica Chimica Acta* Vol. 627, pp. 219-224.
- Gumpu, M. B., Sethuraman, S., Krishnan, U. M., and Rayappan, J. B. B., (2015), "A review on detection of heavy metal ions in water – An electrochemical approach", *Sensors and Actuators B: Chemical* Vol. 213, pp. 515-533.
- Guo, Y., Zhang, Y., Shao, H., Wang, Z., Wang, X., and Jiang, X., (2014), "Label-Free Colorimetric Detection of Cadmium Ions in Rice Samples Using Gold Nanoparticles", *Analytical Chemistry* Vol. 86, pp. 8530-8534.
- Gurnett, K., and Adams, T., (2006), "Native substrates for GaN: the plot thickens", *III-Vs Review* Vol. 19, pp. 39-41.
- Ibbetson, J. P., Fini, P. T., Ness, K. D., DenBaars, S. P., Speck, J. S., and Mishra, U. K., (2000), "Polarization effects, surface states, and the source of electrons in AlGaIn/GaN heterostructure field effect transistors", *Applied Physics Letters* Vol. 77, pp. 250-252.
- Jamaluddin Ahmed, M., and Mamun, M.-A., (2001), "Spectrophotometric determination of lead in industrial, environmental, biological and soil samples using 2,5-dimercapto-1,3,4-thiadiazole", *Talanta* Vol. 55, pp. 43-54.
- Jellouli Ennigrou, D., Ben Sik Ali, M., and Dhahbi, M., (2014), "Copper and Zinc removal from aqueous solutions by polyacrylic acid assisted-ultrafiltration", *Desalination* Vol. 343, pp. 82-87.
- Jha, S. K., (2007), "AlGaIn/GaN Based HEMT Structures and Applications", The Hong Kong Polytechnic University, Hong Kong.
- Jia, F., Wang, Q., Wu, J., Li, Y., and Song, S., (2017a), "Two-Dimensional Molybdenum Disulfide as a Superb Adsorbent for Removing Hg²⁺ from Water", *ACS Sustainable Chemistry & Engineering* Vol. 5, pp. 7410-7419.
- Jia, F., Zhang, X., and Song, S., (2017b), "AFM study on the adsorption of Hg²⁺ on natural molybdenum disulfide in aqueous solutions", *Physical Chemistry Chemical Physics* Vol. 19, pp. 3837-3844.

- Jia, X., Chen, D., Bin, L., Lu, H., Zhang, R., and Zheng, Y., (2016), "Highly selective and sensitive phosphate anion sensors based on AlGa_N/Ga_N high electron mobility transistors functionalized by ion imprinted polymer", *Scientific Reports* Vol. 6, pp. 27728, 1-7.
- Jung, H.-J., Lee, W.-Y., Chung, B. C., and Choi, M. H., (2009), "Mass spectrometric profiling of saturated fatty acid esters of steroids separated by high-temperature gas chromatography", *Journal of Chromatography A* Vol. 1216, pp. 1463-1468.
- Kabir, M. F., Rahman, M. T., Gurung, A., and Qiao, Q., (2018), "Electrochemical Phosphate Sensors Using Silver Nanowires Treated Screen Printed Electrodes", *IEEE Sensors Journal* Vol. 18, pp. 3480-3485.
- Kachosangi, R., Banks, C., Ji, X., and G Compton, R., (2007), "Electroanalytical Determination of Cadmium(II) and Lead(II) Using an in-situ Bismuth Film Modified Edge Plane Pyrolytic Graphite Electrode", *Analytical Sciences*, Vol., 23, pp. 283-289.
- Kadima, W., and Rabenstein, D. L., (1990), "Nuclear magnetic resonance studies of the solution chemistry of metal complexes. 26. Mixed ligand complexes of cadmium, nitrilotriacetic acid, glutathione, and related ligands", *Journal of Inorganic Biochemistry* Vol. 38, pp. 277-288.
- Kalimuthu, P., Kalimuthu, P., and John, S. A., (2009), "Leaflike Structured Multilayer Assembly of Dimercaptothiadiazole on Gold Surface", *The Journal of Physical Chemistry C* Vol. 113, pp. 10176-10184.
- Kang, B. S., Suku, K., Ren, F., Gila, B. P., Abernathy, C. R., and Pearton, S. J., (2005), "AlGa_N/Ga_N-based diodes and gateless HEMTs for gas and chemical sensing", *IEEE Sensors Journal* Vol. 5, pp. 677-680.
- Kang, B. S., Wang, H. T., Ren, F., Gila, B. P., Abernathy, C. R., Pearton, S. J., Johnson, J. W., Rajagopal, P., Roberts, J. C., Piner, E. L., and Linthicum, K. J., (2007), "pH sensor using AlGa_N/Ga_N high electron mobility transistors with Sc₂O₃ in the gate region", *Applied Physics Letters* Vol. 91, pp. 012110, 1-3.
- Kang, B. S., Wang, H. T., Ren, F., and Pearton, S. J., (2008), "Electrical detection of biomaterials using AlGa_N/Ga_N high electron mobility transistors", *Journal of Applied Physics* Vol. 104, pp. 031101.
- Kente, T., and Mhlanga, S. D., (2016), "Gallium nitride nanostructures: Synthesis, characterization and applications", *Journal of Crystal Growth* Vol. 444, pp. 55-72.
- Khan, M. A., Bhattarai, A., Kuznia, J. N., and Olson, D. T., (1993), "High electron mobility transistor based on a Ga_N-Al_xGa_{1-x}N heterojunction", *Applied Physics Letters* Vol. 63, pp. 1214-1215.
- Khan, M. A., Skogman, R. A., Schulze, R. G., and Gershenson, M., (1983), "Properties and ion implantation of Al_xGa_{1-x}N epitaxial single crystal films prepared by low pressure metalorganic chemical vapor deposition", *Applied Physics Letters* Vol. 43, pp. 492-494.
- Kong, D., Wang, H., Cha, J. J., Pasta, M., Koski, K. J., Yao, J., and Cui, Y., (2013), "Synthesis of MoS₂ and MoSe₂ Films with Vertically Aligned Layers", *Nano Letters* Vol. 13, pp. 1341-1347.
- Kosicki, B. B., and Kahng, D., (1969), "Preparation and Structural Properties of Ga_N Thin Films", *Journal of Vacuum Science and Technology* Vol. 6, pp. 593-596.
- Kumar, A., and Whitesides, G. M., (1993), "Features of gold having micrometer to centimeter dimensions can be formed through a combination of stamping with an elastomeric stamp and an alkanethiol ink followed by chemical etching", *Applied Physics Letters* Vol. 63, pp. 2002-2004.
- Kumar, P., Kim, K.-H., Bansal, V., Lazarides, T., and Kumar, N., (2017), "Progress in the sensing techniques for heavy metal ions using nanomaterials", *Journal of Industrial and Engineering Chemistry* Vol. 54, pp. 30-43.
- Kumar, R., Goel, N., Mishra, M., Gupta, G., Fanetti, M., Valant, M., and Kumar, M., (2018), "Growth of MoS₂-MoO₃ Hybrid Microflowers via Controlled Vapor Transport Process for Efficient Gas Sensing at Room Temperature", *Advanced Materials Interfaces* Vol. 5, pp. 1800071.
- Kumari, S., and Chauhan, G. S., (2014), "New Cellulose-Lysine Schiff-Base-Based Sensor-Adsorbent for Mercury Ions", *ACS Applied Materials & Interfaces* Vol. 6, pp. 5908-5917.

- Legeai, S., and Vittori, O., (2006), "A Cu/Nafion/Bi electrode for on-site monitoring of trace heavy metals in natural waters using anodic stripping voltammetry: An alternative to mercury-based electrodes", *Analytica Chimica Acta* Vol. 560, pp. 184-190.
- Li, D., Morimoto, K., Takeshita, T., and Lu, Y., (2001), "Arsenic induces DNA damage via reactive oxygen species in human cells", *Environmental Health and Preventive Medicine* Vol. 6, pp. 27.
- Liddle, A. J., (2008), "Sensitivity analysis of AlGaIn/GaN high electron mobility transistors to process variation", Department of Electrical and Computer Engineering, Air Force Institute of Technology, Air University, Ohio.
- Lin, C., Zhu, Y., Yu, J., Qin, X., Xian, X., Tsow, F., Forzani, E. S., Wang, D., and Tao, N., (2018), "Gradient-Based Colorimetric Sensors for Continuous Gas Monitoring", *Analytical Chemistry* Vol. 90, pp. 5375-5380.
- Liu, X., Li, L., Wei, Y., Zheng, Y., Xiao, Q., and Feng, B., (2015), "Facile synthesis of boron- and nitride-doped MoS₂ nanosheets as fluorescent probes for the ultrafast, sensitive, and label-free detection of Hg²⁺", *Analyst* Vol. 140, pp. 4654-4661.
- Long, G. L., and Winefordner, J. D., (1983), "Limit of Detection: A Closer Look at the IUPAC Definition", *Analytical Chemistry* Vol. 55, pp. 712-718.
- Longobardi, G., Udrea, F., Sque, S., Hurkx, G. A. M., Croon, J., Napoli, E., and Sonsky, J., (2014), "Impact of Donor Traps on the 2DEG and Electrical Behavior of AlGaIn/GaN MISFETs", *IEEE Electron Device Letters* Vol. 35, pp. 27-29.
- López Marzo, A. M., Pons, J., Blake, D. A., and Merkoçi, A., (2013), "All-Integrated and Highly Sensitive Paper Based Device with Sample Treatment Platform for Cd²⁺ Immunodetection in Drinking/ Tap Waters", *Analytical Chemistry* Vol. 85, pp. 3532-3538.
- Lorenz, M. R., and Binkowski, B. B., (1962), "Preparation, Stability, and Luminescence of Gallium Nitride", *Journal of The Electrochemical Society* Vol. 109, pp. 24-26.
- Lou, T., Pan, D., Wang, Y., Jiang, L., and Qin, W., (2011), "Carbon Nanotubes/Ionophore Modified Electrode for Anodic Stripping Determination of Lead", *Analytical Letters* Vol. 44, pp. 1746-1757.
- Lu, X., Lin, Y., Dong, H., Dai, W., Chen, X., Qu, X., and Zhang, X., (2017), "One-Step Hydrothermal Fabrication of Three-dimensional MoS₂ Nanoflower using Polypyrrole as Template for Efficient Hydrogen Evolution Reaction", *Scientific Reports* Vol. 7, pp. 42309.
- Maccà, C., and Wang, J., (1995), "Experimental procedures for the determination of amperometric selectivity coefficients", *Analytica Chimica Acta* Vol. 303, pp. 265-274.
- Magnusson, B., and Örnemark, U., (2014), *Eurachem Guide: The Fitness for Purpose of Analytical Methods – A Laboratory Guide to Method Validation and Related Topics*, 2 Ed., 1, Eurachem
- Mah, V., and Jalilehvand, F., (2010), "Cadmium(II) complex formation with glutathione", *JBC Journal of Biological Inorganic Chemistry* Vol. 15, pp. 441-458.
- Mahaboob, I., Yakimov, M., Hogan, K., Rocco, E., Tozier, S., and Shahedipour-Sandvik, F., (2019), "Dynamic Control of AlGaIn/GaN HEMT Characteristics by Implementation of a p-GaN Body-Diode-Based Back-Gate", *IEEE Journal of the Electron Devices Society* Vol. 7, pp. 581-588.
- Maiti, N., Chadha, R., Das, A., and Kapoor, S., (2016), "Surface selective binding of 2,5-dimercapto-1,3,4-thiadiazole (DMTD) on silver and gold nanoparticles: a Raman and DFT study", *RSC Advances* Vol. 6, pp. 62529-62539.
- Makowski, M. S., Kim, S., Gaillard, M., Janes, D., Manfra, M. J., Bryan, I., Sitar, Z., Arellano, C., Xie, J., Collazo, R., and Ivanisevic, A., (2013), "Physisorption of functionalized gold nanoparticles on AlGaIn/GaN high electron mobility transistors for sensing applications", *Applied Physics Letters*, Vol. 102, pp. 074102, 1-5.
- March, G., Nguyen, T. D., and Piro, B., (2015), "Modified Electrodes Used for Electrochemical Detection of Metal Ions in Environmental Analysis", *Biosensors* Vol. 5, pp. 241-275.
- Maruska, H. P., Rhines, W. C., and Stevenson, D. A., (1972), "Preparation of Mg-doped GaN diodes exhibiting violet electroluminescence", *Materials Research Bulletin* Vol. 7, pp. 777-781.
- Maruska, H. P., and Tietjen, J. J., (1969), "THE PREPARATION AND PROPERTIES OF VAPOR-DEPOSITED SINGLE-CRYSTAL-LINE GaN", *Applied Physics Letters* Vol. 15, pp. 327-329.

- Matsumoto, F., Ozaki, M., Inatomi, Y., Paulson, S. C., and Oyama, N., (1999), "Studies on the Adsorption Behavior of 2,5-Dimercapto-1,3,4-thiadiazole and 2-Mercapto-5-methyl-1,3,4-thiadiazole at Gold and Copper Electrode Surfaces", *Langmuir* Vol. 15, pp. 857-865.
- Mehandru, R., Luo, B., Kang, B. S., Kim, J., Ren, F., Pearton, S. J., Pan, C. C., Chen, G. T., and Chyi, J. I., (2004), "AlGaIn/GaN HEMT based liquid sensors", *Solid-State Electronics* Vol. 48, pp. 351-353.
- Mehlhose, S., (2019), "Biofunctionalization of GaN/AlGaIn/GaN High Electron Mobility Transistors", Combined Faculty of Natural Sciences and Mathematics, Heidelberg University, Germany.
- Miccoli, C., Martino, V. C., Reina, S., and Rinaudo, S., (2013), "Trapping and Thermal Effects Analysis for AlGaIn/GaN HEMTs by Means of TCAD Simulations", *IEEE Electron Device Letters* Vol. 34, pp. 1121-1123.
- Micovic, M., Kurdoghlian, A., Janke, P., Hashimoto, P., Wong, D. W. S., Moon, J. S., McCray, L., and Chanh, N., (2001), "AlGaIn/GaN heterojunction field effect transistors grown by nitrogen plasma assisted molecular beam epitaxy", *IEEE Transactions on Electron Devices* Vol. 48, pp. 591-596.
- Mimura, T., Yokoyama, N., Kusakawa, H., Suyama, K., and Fukuta, M., (1979), "MP-A4 GaAs MOSFET for low-power high-speed logic applications", *IEEE Transactions on Electron Devices* Vol. 26, pp. 1828-1828.
- More, A., (2019), "GaN Semiconductors Devices Market 2019 Global Industry Company Profile, Brief Analysis by Regions, Market Size & Growth, Future Scope and Trends by Forecast 2023". The Express Wire, USA.
- Morkoc, H., (2008), *Handbook of Nitride Semiconductors and Devices*, Ed., 01, WILEY-VCH Verlag GmbH & Co. KGaA Weinheim, pp. 1257.
- Muralikrishna, S., Sureshkumar, K., Varley, T. S., Nagaraju, D. H., and Ramakrishnappa, T., (2014), "In situ reduction and functionalization of graphene oxide with l-cysteine for simultaneous electrochemical determination of cadmium(II), lead(II), copper(II), and mercury(II) ions", *Analytical Methods* Vol. 6, pp. 8698-8705.
- Myers, M., Khir, F. L. M., Podolska, A., Umana-Membreno, G. A., Nener, B., Baker, M., and Parish, G., (2013), "Nitrate ion detection using AlGaIn/GaN heterostructure-based devices without a reference electrode", *Sensors and Actuators B: Chemical* Vol. 181, pp. 301-305.
- Nakamura, S., (1995), "InGaIn/AlGaIn blue-light-emitting diodes", *Journal of Vacuum Science & Technology A* Vol. 13, pp. 705-710.
- Nakamura, S., Iwasa, N., Senoh, M., and Mukai, T., (1992), "Hole Compensation Mechanism of P-Type GaN Films", *Japanese Journal of Applied Physics* Vol. 31, pp. 1258-1266.
- Nakamura, S., Senoh, M., and Mukai, T., (1993), "High-power InGaIn/GaN double-heterostructure violet light emitting diodes", *Applied Physics Letters* Vol. 62, pp. 2390-2392.
- Nakamura, S., Senoh, M., Nagahama, S.-i., Iwasa, N., Yamada, T., Matsushita, T., Kiyoku, H., and Sugimoto, Y., (1996), "InGaIn-Based Multi-Quantum-Well-Structure Laser Diodes", *Japanese Journal of Applied Physics* Vol. 35, pp. L74-L76.
- Nigam, A., Bhat, T. N., Bhati, V. S., Dolmanan, S. B., Tripathy, S., and Kumar, M., (2019a), "MPA-GSH Functionalized AlGaIn/GaN High-Electron Mobility Transistor-Based Sensor for Cadmium Ion Detection", *IEEE Sensors Journal* Vol. 19, pp. 2863-2870.
- Nigam, A., Bhat, T. N., Rajamani, S., Dolmanan, S. B., Tripathy, S., and Kumar, M., (2017), "Effect of self-heating on electrical characteristics of AlGaIn/GaN HEMT on Si (111) substrate", *AIP Advances* Vol. 7, pp. 085015, 1-10.
- Nigam, A., Bhati, V. S., Bhat, T. N., Dolmanan, S. B., Tripathy, S., and Kumar, M., (2019b), "Sensitive and Selective Detection of Pb²⁺ Ions Using 2,5-Dimercapto-1,3,4-Thiadiazole Functionalized AlGaIn/GaN High Electron Mobility Transistor", *IEEE Electron Device Letters* Vol. 40, pp. 1976-1979.
- Nigam, A., Goel, N., Bhat, T. N., Tawabur Rahman, M., Dolmanan, S. B., Qiao, Q., Tripathy, S., and Kumar, M., (2020), "Real time detection of Hg²⁺ ions using MoS₂ functionalized AlGaIn/GaN high electron mobility transistor for water quality monitoring", *Sensors and Actuators B: Chemical* Vol. 309, pp. 127832.

- Odobašić, A., Šestan, I., and Begić, S., (2019), "Biosensors for Determination of Heavy Metals in Waters. Intechopen.
- Oldham, K. B., (2008), "A Gouy–Chapman–Stern model of the double layer at a (metal)/(ionic liquid) interface", *Journal of Electroanalytical Chemistry* Vol. 613, pp. 131-138.
- Organization, W. H., (2011), *Cadmium in Drinking-water "Background document for development of WHO Guidelines for Drinking-water Quality"*, World Health Organization 2011, 2011
- Parish, G., Umana-Membreno, G. A., Jolley, S. M., Buttari, D., Keller, S., Nener, B. D., and Mishra, U. K., (2004), "AlGaN/AlN/GaN High Electron Mobility Transistors with Improved Carrier Transport In "Conference on Optoelectronic and Microelectronic Materials and Devices, 2004.", pp. 29-32.
- Pearnton, S. J., (2000), "Optoelectronic Properties of Semiconductors and Superlattices", *GaN and Related Materials*, Edited, Vol. 2, Gordon and Breach Science Publishers, pp. 698, 2000.
- Pearnton, S. J., Kang, B. S., Kim, S., Ren, F., Gila, B. P., Abernathy, C. R., Lin, J., and Chu, S. N. G., (2004), "GaN-based diodes and transistors for chemical, gas, biological and pressure sensing", *Journal of Physics: Condensed Matter* Vol. 16, pp. R961-R994.
- Pei, K. L., Sooriyaarachchi, M., Sherrell, D. A., George, G. N., and Gailer, J., (2011), "Probing the coordination behavior of Hg²⁺, CH₃Hg⁺, and Cd²⁺ towards mixtures of two biological thiols by HPLC-ICP-AES", *Journal of Inorganic Biochemistry* Vol. 105, pp. 375-381.
- Pillai, S. O., (2015), *Solid State Physics*, Seventh Ed., New Age International Publishers,
- Piprek, J., (2007), *Nitride Semiconductor Devices*, Ed., WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim Weinheim,
- Plummer, J. D., Deal, M. D., and Griffin, P. B., (2012), *Silicon VLSI Technology: Fundamentals, Practice, and Modeling*, Fourth Ed., Pearson Education Inc. Prentice Hall,
- Podolska, A., Kocan, M., Cabezas, A. M. G., Wilson, T. D., Umana-Membreno, G. A., Nener, B. D., Parish, G., Keller, S., and Mishra, U. K., (2010), "Ion versus pH sensitivity of ungated AlGaIn/GaN heterostructure-based devices", *Applied Physics Letters*, Vol. 97, pp. 012108, 1-3.
- Priyadarshini, E., and Pradhan, N., (2017), "Gold nanoparticles as efficient sensors in colorimetric detection of toxic metal ions: A review", *Sensors and Actuators B: Chemical* Vol. 238, pp. 888-902.
- Quay, R., (2008), *Gallium Nitride Electronics*, Ed., 96, Springer-Verlag Berlin Heidelberg Germany, pp. 1-469.
- Rabbaa, S., and Stiens, J., (2012), "Validation of a triangular quantum well model for GaN-based HEMTs used in pH and dipole moment sensing", *Journal of Physics D: Applied Physics* Vol. 45, pp. 475101.
- Reeves, G. K., and Harrison, H. B., (1982), "Obtaining the specific contact resistance from transmission line model measurements", *IEEE Electron Device Letters* Vol. 3, pp. 111-113.
- Ren, F., Pearnton, S. J., Kang, B. S., and Chu, B. H., (2011), "AlGaIn/GaN High Electron Mobility Transistor Based Sensors for Bio-Applications", *Biosensors for Health, Environment and Biosecurity*, Edited by P. P. A. Serra, InTech, pp. 540, 2011.
- Ren, F., and Pearnton, S. J., (2011), *Semiconductor Device-Based Sensors for Gas, Chemical, and Bio Applications*, Ed., CRC Press, Taylor & Francis Group, pp. 303.
- Rohrbaugh, N., Bryan, I., Bryan, Z., Arellano, C., Collazo, R., and Ivanisevic, A., (2014), "AlGaIn/GaN field effect transistors functionalized with recognition peptides", *Applied Physics Letters* Vol. 105, pp. 134103.
- Ruan, H., Kang, Y., Gladwin, E., and Claus, R. O., (2015), "Selective detection of heavy metal ions by self assembled chemical field effect transistors", *Applied Physics Letters* Vol. 106, pp. 163102.
- Sabui, G., Parbrook, P. J., Arredondo-Arechavala, M., and Shen, Z. J., (2016), "Modeling and simulation of bulk gallium nitride power semiconductor devices", *AIP Advances* Vol. 6, pp. 055006.

- Sadi, T., Kelsall, R. W., and Pilgrim, N. J., (2006), "Investigation of self-heating effects in submicrometer GaN/AlGa_N HEMTs using an electrothermal Monte Carlo method", *IEEE Transactions on Electron Devices* Vol. 53, pp. 2892-2900.
- Sarbu, I., and Sebarchievici, C., (2017), "Chapter 7 - Solar Thermal-Driven Cooling Systems", *Solar Heating and Cooling Systems*, Edited by I. Sarbu and C. Sebarchievici, Academic Press, pp. 241-313, 2017.
- Sayyah, S. M., Shaban, M., and Rabia, M., (2016), "A High-Sensitivity Potentiometric Mercuric Ion Sensor Based on m-Toluidine Films", *IEEE Sensors Journal* Vol. 16, pp. 1541-1548.
- Schöning, M. J., Tsarouchas, D., Beckers, L., Schubert, J., Zander, W., Kordoš, P., and Lüth, H., (1996), "A highly long-term stable silicon-based pH sensor fabricated by pulsed laser deposition technique", *Sensors and Actuators B: Chemical* Vol. 35, pp. 228-233.
- Sentaurus, (2013), *Sentaurus user guide, version I-2013.12*, Synopsys, Inc., 2013
- Shaily, Kumar, A., Parveen, I., and Ahmed, N., (2018), "Highly selective and sensitive coumarin-triazole-based fluorometric 'turn-off' sensor for detection of Pb²⁺ ions", *Luminescence*, Vol. 33, pp. 713-721.
- Shen, L., Heikman, S., Moran, B., Coffie, R., Zhang, N., Buttari, D., Smorchkova, I. P., Keller, S., DenBaars, S. P., and Mishra, U. K., (2001), "AlGa_N/AlN/GaN high-power microwave HEMT", *IEEE Electron Device Letters* Vol. 22, pp. 457-459.
- Shi, Y., Chen, N., Su, Y., Wang, H., and He, Y., (2018), "Silicon nanohybrid-based SERS chips armed with an internal standard for broad-range, sensitive and reproducible simultaneous quantification of lead(II) and mercury(II) in real systems", *Nanoscale* Vol. 10, pp. 4010-4018.
- Shrivastava, A., and Gupta, V., (2011), "Methods for the determination of limit of detection and limit of quantitation of the analytical methods", *Chronicles of Young Scientists*, Vol. 2, pp. 21-25.
- Sirkeli, V. P., Tiginyanu I. M., and Hartnagel, H. L., (2020), "Recent Progress in GaN-Based Devices for Terahertz Technology In "4th International Conference on Nanotechnologies and Biomedical Engineering - 2020" (Prof. Ion Tiginyanu, Prof. Victor Sontea and S. Railean, eds.), pp. 231-236. Springer Switzerland AG 2020, Chisinau, Moldova.
- Smorchkova, I. P., Elsass, C. R., Ibbetson, J. P., Vetury, R., Heying, B., Fini, P., Haus, E., DenBaars, S. P., Speck, J. S., and Mishra, U. K., (1999), "Polarization-induced charge and electron mobility in AlGa_N/GaN heterostructures grown by plasma-assisted molecular-beam epitaxy", *Journal of Applied Physics* Vol. 86, pp. 4520-4526.
- Steinhoff, G., (2008), "Group III-Nitrides for Bio- and Electrochemical Sensors", Faculty of Physicsnt, Technical University of Munich.
- Steinhoff, G., Hermann, M., Schaff, W. J., Eastman, L. F., Stutzmann, M., and Eickhoff, M., (2003), "pH response of GaN surfaces and its application for pH-sensitive field-effect transistors", *Applied Physics Letters* Vol. 83, pp. 177-179.
- Swearingen, C. B., Wernette, D. P., Cropek, D. M., Lu, Y., Sweedler, J. V., and Bohn, P. W., (2005), "Immobilization of a Catalytic DNA Molecular Beacon on Au for Pb(II) Detection", *Analytical Chemistry* Vol. 77, pp. 442-448.
- Sze, S. M., and Lee, M. K., (2012), *Semiconductor Devices: Physics and Technology, 3rd Edition: Physics and Technology*, Ed., John Wiley & Sons,
- Taheri, P., Wang, J., Xing, H., Destino, J. F., Arik, M. M., Zhao, C., Kang, K., Blizzard, B., Zhang, L., Zhao, P., Huang, S., Yang, S., Bright, F. V., Cerne, J., and Zeng, H., (2016), "Growth mechanism of largescale MoS₂ monolayer by sulfurization of MoO₃ film", *Materials Research Express* Vol. 3, pp. 075009.
- Taking, S., (2012), "AlN/GaN MOS-HEMTs Technology", Division of Electronics and Nanoscale Engineeringnt, University of Glasgow.
- Tang, W.-W., Zeng, G.-M., Gong, J.-L., Liang, J., Xu, P., Zhang, C., and Huang, B.-B., (2014), "Impact of humic/fulvic acid on the removal of heavy metals from aqueous solutions using nanomaterials: A review", *Science of The Total Environment* Vol. 468-469, pp. 1014-1027.
- Tatsuma, T., Yokoyama, Y., Buttry, D. A., and Oyama, N., (1997), "Electrochemical Polymerization and Depolymerization of 2,5-Dimercapto-1,3,4-thiadiazole. QCM and Spectroscopic Analysis", *The Journal of Physical Chemistry B* Vol. 101, pp. 7556-7562.

- Tham, W. H., Ang, D. S., Bera, L. K., Dolmanan, S. B., Bhat, T. N., Kajen, R. S., Tan, H. R., Teo, S. L., and Tripathy, S., (2016), "Gold-free contacts on Al_xGa_{1-x}N/GaN high electron mobility transistor structure grown on a 200-mm diameter Si(111) substrate", *Journal of Vacuum Science & Technology B* Vol. 34, pp. 041217.
- Tham, W. H., Bera, L. K., Ang, D. S., Dolmanan, S. B., Bhat, T. N., and Tripathy, S., (2015), "Al_xGa_{1-x}N/GaN MISHEMTs With a Common Gold-Free Metal-Stack for Source/Drain/Gate", *IEEE Electron Device Letters* Vol. 36, pp. 1291-1294.
- Thapa, R., Alur, S., Kim, K., Tong, F., Sharma, Y., Kim, M., Ahyi, C., Dai, J., Hong, J. W., Bozack, M., Williams, J., Son, A., Dabiran, A., and Park, M., (2012), "Biofunctionalized AlGa_N/Ga_N high electron mobility transistor for DNA hybridization detection", *Applied Physics Letters* Vol. 100, pp. 232109, 1-4.
- Tian, H., He, J., and Hu, M., (2019), "A selectivity-controlled adsorbent of molybdenum disulfide nanosheets armed with superparamagnetism for rapid capture of mercury ions", *Journal of Colloid and Interface Science* Vol. 551, pp. 251-260.
- Tripathy, S., Lin, V. K. X., Dolmanan, S. B., Tan, J. P. Y., Kajen, R. S., Bera, L. K., Teo, S. L., Kumar, M. K., Arulkumaran, S., Ng, G. I., Vicknesh, S., Todd, S., Wang, W. Z., Lo, G. Q., Li, H., Lee, D., and Han, S., (2012), "AlGa_N/Ga_N two-dimensional-electron gas heterostructures on 200 mm diameter Si(111)", *Applied Physics Letters* Vol. 101, pp. 082110.
- Udhayakumari, D., and Velmathi, S., (2013), "Colorimetric and fluorescent sensor for selective sensing of Hg²⁺ ions in semi aqueous medium", *Journal of Luminescence* Vol. 136, pp. 117-121.
- van Hal, R. E. G., Eijkel, J. C. T., and Bergveld, P., (1996), "A general model to describe the electrostatic potential at electrolyte oxide interfaces", *Advances in Colloid and Interface Science* Vol. 69, pp. 31-62.
- Van Zant, P., (2013), *Microchip Fabrication, Sixth Edition: A Practical Guide to Semiconductor Processing*, Ed., McGraw-Hill Education,
- Varshni, Y. P., (1967), "Temperature dependence of the energy gap in semiconductors", *Physica* Vol. 34, pp. 149-154.
- Vasimalai, N., and John, S. A., (2011), "Spectrofluorimetric determination of picogram level Pb(II) using a dimercaptotriazazole fluorophore", *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* Vol. 82, pp. 153-158.
- Walia, S., Balendhran, S., Wang, Y., Kadir, R. A., Zoolfakar, A. S., Atkin, P., Ou, J. Z., Sriram, S., Kalantar-zadeh, K., and Bhaskaran, M., (2013), "Characterization of metal contacts for two-dimensional MoS₂ nanoflakes", *Applied Physics Letters* Vol. 103, pp. 232105.
- Wang, F., Li, G., Zheng, J., Ma, J., Yang, C., and Wang, Q., (2018a), "Hydrothermal synthesis of flower-like molybdenum disulfide microspheres and their application in electrochemical supercapacitors", *RSC Advances* Vol. 8, pp. 38945-38954.
- Wang, H.-T., Kang, B. S., Jr., T. F. C., Lele, T. P., Tseng, Y., Ren, F., Pearnton, S. J., Johnson, W. J., Rajagopal, P., Roberts, J. C., Piner, E. L., and Linthicum, K. J., (2007), "Fast electrical detection of Hg(II) ions with AlGa_N/Ga_N high electron mobility transistors", *Applied Physics Letters* Vol. 91, pp. 042114, 1-3.
- Wang, H., Kong, D., Johanes, P., Cha, J. J., Zheng, G., Yan, K., Liu, N., and Cui, Y., (2013a), "MoSe₂ and WSe₂ Nanofilms with Vertically Aligned Molecular Layers on Curved and Rough Surfaces", *Nano Letters* Vol. 13, pp. 3426-3433.
- Wang, H., Lu, Z., Xu, S., Kong, D., Cha, J. J., Zheng, G., Hsu, P.-C., Yan, K., Bradshaw, D., Prinz, F. B., and Cui, Y., (2013b), "Electrochemical tuning of vertically aligned MoS₂ nanofilms and its application in improving hydrogen evolution reaction", *Proceedings of the National Academy of Sciences* Vol. 110, pp. 19701.
- Wang, H. T., Kang, B. S., Chancellor, T. F., Lele, T. P., Tseng, Y., Ren, F., Pearnton, S. J., Dabiran, A., Osinsky, A., and Chow, P. P., (2007), "Selective Detection of Hg (II) Ions from Cu (II) and Pb (II) Using AlGa_N/Ga_N High Electron Mobility Transistors", Vol. 10, pp. J150-J153.
- Wang, J.-N., (2011), "A Microfluidic Long-Period Fiber Grating Sensor Platform for Chloride Ion Concentration Measurement", *Sensors* Vol. 11, pp. 8550-8568.

- Wang, X., Hu, G., Ma, Z., Ran, J., Wang, C., Xiao, H., Tang, J., Li, J., Wang, J., Zeng, Y., Li, J., and Wang, Z., (2007), "AlGaIn/GaN/SiC HEMT structure with high mobility GaN thin layer as channel grown by MOCVD", *Journal of Crystal Growth* Vol. 298, pp. 835-839.
- Wang, Y., Jin, Y., Li, S., Han, J., Ju, Z., and Jia, M., (2018b), "Flower-like MoS₂ supported on three-dimensional graphene aerogels as high-performance anode materials for sodium-ion batteries", *Ionics* Vol. 24, pp. 3431-3437.
- Wang, Y., Zhou, Z., Qing, X., Zhong, W., Liu, Q., Wang, W., Li, M., Liu, K., and Wang, D., (2016), "Ion sensors based on novel fiber organic electrochemical transistors for lead ion detection", *Analytical and Bioanalytical Chemistry* Vol. 408, pp. 5779-5787.
- WHO, (2008), *Guidelines for Drinking-water Quality*, World Health Organization, Geneva 2008
- WHO, (2011), *Cadmium in Drinking-water "Background document for development of WHO Guidelines for Drinking-water Quality"*, World Health Organization 2011, 2011
- Wu, C.-Y., Mouri, H., Chen, S.-S., Zhang, D.-Z., Koga, M., and Kobayashi, J., (2016a), "Removal of trace-amount mercury from wastewater by forward osmosis", *Journal of Water Process Engineering* Vol. 14, pp. 108-116.
- Wu, J. M., Chang, W. E., Chang, Y. T., and Chang, C.-K., (2016b), "Piezo-Catalytic Effect on the Enhancement of the Ultra-High Degradation Activity in the Dark by Single- and Few-Layers MoS₂ Nanoflowers", *Advanced Materials* Vol. 28, pp. 3718-3725.
- Wu, Y., Bing Li, N., and Qun Luo, H. J. M. A., (2008), "Electrochemical determination of Pb(II) at a gold electrode modified with a self-assembled monolayer of 2,5-dimercapto-1,3,4-thiadiazole", Vol. 160, pp. 185-190.
- Xiao, S., Chen, L., Xiong, X., Zhang, Q., Feng, J., Deng, S., and Zhou, L., (2018), "A new impedimetric sensor based on anionic intercalator for detection of lead ions with low cost and high sensitivity", *Journal of Electroanalytical Chemistry* Vol. 827, pp. 175-180.
- Xu, H., Xu, D. C., and Wang, Y., (2017), "Natural Indices for the Chemical Hardness/Softness of Metal Cations and Ligands", *ACS Omega* Vol. 2, pp. 7185-7193.
- Xuan, X., Hossain, M. F., and Park, J. Y., (2016), "A Fully Integrated and Miniaturized Heavy-metal-detection Sensor Based on Micro-patterned Reduced Graphene Oxide", *Scientific reports* Vol. 6, pp. 33125-33125.
- Xue, D., Zhang, H., ul Ahmad, A., Liang, H., Liu, J., Xia, X., Guo, W., Huang, H., and Xu, N., (2020), "Enhancing the sensitivity of the reference electrode free AlGaIn/GaN HEMT based pH sensors by controlling the threshold voltage", *Sensors and Actuators B: Chemical* Vol. 306, pp. 127609.
- Yang, D., Wang, L., Chen, Z., Megharaj, M., and Naidu, R., (2014), "Voltammetric Determination of Lead (II) and Cadmium (II) Using a Bismuth Film Electrode Modified with Mesoporous Silica Nanoparticles", *Electrochimica Acta* Vol. 132, pp. 223-229.
- Yang, S., Li, J., Shao, D., Hu, J., and Wang, X., (2009), "Adsorption of Ni(II) on oxidized multi-walled carbon nanotubes: Effect of contact time, pH, foreign ions and PAA", *Journal of Hazardous Materials* Vol. 166, pp. 109-116.
- Yap, S. H. K., Chien, Y.-H., Tan, R., bin Shaik Alauddin, A. R., Ji, W. B., Tjin, S. C., and Yong, K.-T., (2018), "An Advanced Hand-Held Microfiber-Based Sensor for Ultrasensitive Lead Ion Detection", *ACS Sensors* Vol. 3, pp. 2506-2512.
- Yeh, C., and Yang, Y., (2017), "A portable miniaturized Pb²⁺ detector using ion-responsive hydrogel with wireless interrogation capability In "2017 IEEE 30th International Conference on Micro Electro Mechanical Systems (MEMS)", pp. 1056-1059.
- Yifei Guo, Xiuli Fu, and Peng, Z., (2017), "Growth and Mechanism of MoS₂ Nanoflowers with Ultrathin Nanosheets", *Journal of Nanomaterials* Vol. 2017, pp. 1-6.
- Yoshida, S., Misawa, S., and Gonda, S., (1983), "Improvements on the electrical and luminescent properties of reactive molecular beam epitaxially grown GaN films by using AlN-coated sapphire substrates", *Applied Physics Letters* Vol. 42, pp. 427-429.
- Zhang, H., Tu, J., Yang, S., Sheng, K., and Wang, P., (2019), "Optimization of gate geometry towards high-sensitivity AlGaIn/GaN pH sensor", *Talanta* Vol. 205, pp. 120134.

- Zhang, L., Li, D. W., Song, W., Shi, L., Li, Y., and Long, Y. T., (2010), "High Sensitive On-Site Cadmium Sensor Based on AuNPs Amalgam Modified Screen-Printed Carbon Electrodes", *IEEE Sensors Journal* Vol. 10, pp. 1583-1588.
- Zhang, M., Ge, L., Ge, S., Yan, M., Yu, J., Huang, J., and Liu, S., (2013), "Three-dimensional paper-based electrochemiluminescence device for simultaneous detection of Pb^{2+} and Hg^{2+} based on potential-control technique", *Biosensors and Bioelectronics* Vol. 41, pp. 544-550.
- Zhang, S., Li, L., and Kumar, A., (2008), *Materials Characterization Techniques*, Ed., CRC Press, pp. 344.
- Zhao, C., Zhong, G., Kim, D.-E., Liu, J., and Liu, X., (2014), "A portable lab-on-a-chip system for gold-nanoparticle-based colorimetric detection of metal ions in water", *Biomicrofluidics* Vol. 8, pp. 052107.
- Zheng, X., Zhu, Y., Sun, Y., and Jiao, Q., (2018), "Hydrothermal synthesis of MoS_2 with different morphology and its performance in thermal battery", *Journal of Power Sources* Vol. 395, pp. 318-327.
- Zhou, G., Chang, J., Cui, S., Pu, H., Wen, Z., and Chen, J., (2014), "Real-Time, Selective Detection of Pb^{2+} in Water Using a Reduced Graphene Oxide/Gold Nanoparticle Field-Effect Transistor Device", *ACS Applied Materials & Interfaces* Vol. 6, pp. 19235-19241.
- Zhou, Y., Zhong, Y., Gao, H., Dai, S., He, J., Feng, M., Zhao, Y., Sun, Q., Dingsun, A., and Yang, H., (2017), "p-GaN Gate Enhancement-Mode HEMT Through a High Tolerance Self-Terminated Etching Process", *IEEE Journal of the Electron Devices Society* Vol. 5, pp. 340-346.
- Zhu, L., Tian, C., Yang, R., and Zhai, J., (2008), "Anodic Stripping Voltammetric Determination of Lead in Tap Water at an Ordered Mesoporous Carbon/Nafion Composite film Electrode", *Electroanalysis*, Vol. 20, pp. 527-533.