

DAFTAR PUSTAKA

- Abbas, A., Liang, Q., Abbas, S., Liaqat, M., Rubab, S., and Tabish, T.A., 2022, Eco-Friendly Sustainable Synthesis of Graphene Quantum Dots from Biowaste as a Highly Selective Sensor, *Nanomaterials*, 12, 1–13.
- Abbas, A., Mariana, L.T., and Phan, A.N., 2018, Biomass-waste derived graphene quantum dots and their applications, *Carbon N. Y.*, 140, 77–99.
- Abbas, A., Tabish, T.A., Bull, S.J., Lim, T.M., and Phan, A.N., 2020, High yield synthesis of graphene quantum dots from biomass waste as a highly selective probe for Fe^{3+} sensing, *Sci. Rep.*, 10, 1–16.
- Ahn, J., Song, Y., Kwon, J.E., Woo, J., and Kim, H., 2019, Characterization of food waste-driven carbon dot focusing on chemical structural, electron relaxation behavior and Fe^{3+} selective sensing, *Data Br.*, 25, 104038.
- Ai, L., Yang, Y., Wang, B., Chang, J., Tang, Z., Yang, B., and Lu, S., 2021, Insights into photoluminescence mechanisms of carbon dots: advances and perspectives, *Sci. Bull.*, 66, 839–856.
- Alas, M.O. and Genc, R., 2017, An investigation into the role of macromolecules of different polarity as passivating agent on the physical, chemical and structural properties of fluorescent carbon nanodots, *J. Nanoparticle Res.*, 19, 1–15.
- Ali, M., Riaz, R., Anjum, A.S., Sun, K.C., Li, H., Ahn, S.J., Jeong, S.H., and Ko, M.J., 2021, Microwave-assisted ultrafast in-situ growth of N-doped carbon quantum dots on multiwalled carbon nanotubes as an efficient electrocatalyst for photovoltaics, *J. Colloid Interface Sci.*, 586, 349–361.
- Aslandaş, A.M., Balci, N., Arik, M., Şakiroğlu, H., Onganer, Y., and Meral, K., 2015, Liquid nitrogen-assisted synthesis of fluorescent carbon dots from Blueberry and their performance in Fe^{3+} detection, *Appl. Surf. Sci.*, 356, 747–752.
- Atchudan, R., Edison, T.N.J.I., Aseer, K.R., Perumal, S., Karthik, N., and Lee, Y.R., 2018, Highly fluorescent nitrogen-doped carbon dots derived from *Phyllanthus acidus* utilized as a fluorescent probe for label-free selective detection of Fe^{3+} ions, live cell imaging and fluorescent ink, *Biosens. Bioelectron.*, 99, 303–311.
- Atchudan, R., Edison, T.N.J.I., Aseer, K.R., Perumal, S., and Lee, Y.R., 2018, Hydrothermal conversion of *Magnolia liliiflora* into nitrogen-doped carbon dots as an effective turn-off fluorescence sensing, multi-colour cell imaging and fluorescent ink, *Colloids Surf. B.*, 169, 321–328.
- Atchudan, R., Edison, T.N.J.I., Chakradhar, D., Perumal, S., Shim, J.J., and Lee, Y.R., 2017, Facile green synthesis of nitrogen-doped carbon dots using *Chionanthus retusus* fruit extract and investigation of their suitability for metal

ion sensing and biological applications, *Sens Actuators B Chem.*, 246, 497–509.

- Atchudan, R., Edison, T.N.J.I., Perumal, S., Muthuchamy, N., and Lee, Y.R., 2020, Hydrophilic nitrogen-doped carbon dots from biowaste using dwarf banana peel for environmental and biological applications, *Fuel*, 275, 117821.
- Azami, M., Wei, J., Valizadehderakhshan, M., Jayapalan, A., Ayodele, O.O., and Nowlin, K., 2023, Effect of Doping Heteroatoms on the Optical Behaviors and Radical Scavenging Properties of Carbon Nanodots, *J. Phys. Chem. C*.
- Baker, S.N. and Baker, G.A., 2010, Luminescent Carbon Nanodots: Emergent Nanolights, *Angewandte Chemie*, 49(38), 6726–6744.
- Bandi, R., Gangapuram, B.R., Dadigala, R., Eslavath, R., Singh, S.S., and Guttena, V., 2016, Facile and green synthesis of fluorescent carbon dots from onion waste and their potential applications as sensor and multicolour imaging agents, *RSC Adv.*, 6, 28633–28639.
- Baweja, H. and Jeet, K., 2019, Economical and green synthesis of graphene and carbon quantum dots from agricultural waste, *Mater. Res. Express*, 6, .
- Behnam, B., Shier, W.T., Nia, A.H., Abnous, K., and Ramezani, M., 2013, Non-covalent functionalization of single-walled carbon nanotubes with modified polyethyleneimines for efficient gene delivery, *Int. J. Pharm.*, 454, 204–215.
- Bhattacharya, S., Phatake, R.S., Nabha Barnea, S., Zerby, N., Zhu, J.J., Shikler, R., Lemcoff, N.G., and Jelinek, R., 2019, Fluorescent Self-Healing Carbon Dot/Polymer Gels, *ACS Nano*, 13, 1433–1442.
- Bhattacharyya, S., Ehrat, F., Urban, P., Teves, R., Wyrwich, R., Döblinger, M., Feldmann, J., Urban, A.S., and Stolarczyk, J.K., 2017, Effect of nitrogen atom positioning on the trade-off between emissive and photocatalytic properties of carbon dots, *Nat. Commun.*, 8, 1–9.
- Bottari, G. and Torres, T., 2017, A New Dimension for Low-Dimensional Carbon Nanostructures, *Chem*, 3, 21–24.
- Bottini, M., Balasubramanian, C., Dawson, M.I., Bergamaschi, A., Bellucci, S., and Mustelin, T., 2006, Isolation and characterization of fluorescent nanoparticles from pristine and oxidized electric arc-produced single-walled carbon nanotubes, *J. Phys. Chem. B*, 110, 831–836.
- Carbonaro, Corpino, Salis, Mocci, Thakkar, Olla, and Ricci, 2019, On the Emission Properties of Carbon Dots: Reviewing Data and Discussing Models, *C — J. Carbon Res.*, 5, 60.
- Chai, X., He, H., Fan, H., Kang, X., and Song, X., 2019, A hydrothermal-carbonization process for simultaneously production of sugars, graphene quantum dots, and porous carbon from sugarcane bagasse, *Bioresour. Technol.*, 282, 142–147.
- Chen, Y., Sun, X., Pan, W., Yu, G., and Wang, J., 2020, Fe³⁺-Sensitive Carbon

Dots for Detection of Fe^{3+} in Aqueous Solution and Intracellular Imaging of Fe^{3+} Inside Fungal Cells, *Front. Chem.*, 7, 1–9.

- Danial, W.H., Abdullah, M., Abu Bakar, M.A., Yunus, M.S., Ibrahim, A.R., Iqbal, A., and Adnan, N.N., 2022, The valorisation of grass waste for the green synthesis of graphene quantum dots for nonlinear optical applications, *Opt. Mater. (Amst)*, 132, 112853.
- Das, G.S., Shim, J.P., Bhatnagar, A., Tripathi, K.M., and Kim, T.Y., 2019, Biomass-derived Carbon Quantum Dots for Visible-Light-Induced Photocatalysis and Label-Free Detection of Fe(III) and Ascorbic acid, *Sci. Rep.*, 9, 1–9.
- Das, S.K., Chakrabarty, S., Gawas, R., and Jasuja, K., 2022, Serendipitous formation of photoluminescent carbon quantum dots by mere immersion of a polymer in an organic solvent, *Carbon Trends*, 8, 100183.
- Diana, F.R.M., Suratman, A., Wahyuni, E.T., Mudasir, M., and Suherman, S., 2022, Development of N,S-CDs fluorescent probe method for early detection of Cr(VI) in the environment, *Chem. Pap.*, 76, 7793–7809.
- Ding, H., Yu, S.B., Wei, J.S., and Xiong, H.M., 2016, Full-color light-emitting carbon dots with a surface-state-controlled luminescence mechanism, *ACS Nano*, 10, 484–491.
- Ding, H., Zhou, X.X., Zhang, Z.H., Zhao, Y.P., Wei, J.S., and Xiong, H.M., 2022, Large scale synthesis of full-color emissive carbon dots from a single carbon source by a solvent-free method, *Nano Res.*, 15, 3548–3555.
- Dong, Y., Shao, J., Chen, C., Li, H., Wang, R., Chi, Y., Lin, X., and Chen, G., 2012, Blue luminescent graphene quantum dots and graphene oxide prepared by tuning the carbonization degree of citric acid, *Carbon N. Y.*, 50, 4738–4743.
- Du, F., Cheng, Z., Tan, W., Sun, L., and Ruan, G., 2020, Development of sulfur doped carbon quantum dots for highly selective and sensitive fluorescent detection of Fe^{2+} and Fe^{3+} ions in oral ferrous gluconate samples, *Spectrochim. Acta - Part A Mol. Biomol. Spectrosc.*, 226, 117602.
- Dua, S., Kumar, P., Pani, B., Kaur, A., Khanna, M., and Bhatt, G., 2023, Stability of carbon quantum dots: a critical review, *RSC Adv.*, 13, 13845–13861.
- Edison, T.N.J.I., Atchudan, R., Shim, J.J., Kalimuthu, S., Ahn, B.C., and Lee, Y.R., 2016, Turn-off fluorescence sensor for the detection of ferric ion in water using green synthesized N-doped carbon dots and its bio-imaging, *J. Photochem. Photobiol. B Biol.*, 158, 235–242.
- Falco, C., Perez Caballero, F., Babonneau, F., Gervais, C., Laurent, G., Titirici, M.M., and Baccile, N., 2011, Hydrothermal carbon from biomass: Structural differences between hydrothermal and pyrolyzed carbons via ^{13}C solid state NMR, *Langmuir*, 27, 14460–14471.
- Feng, Z., Adolfsson, K.H., Xu, Y., Fang, H., Hakkarainen, M., and Wu, M., 2021, Carbon dot/polymer nanocomposites: From green synthesis to energy,

- environmental and biomedical applications, *Sustain. Mater. Technol.*, 29, e00304.
- Gao, D., Zhang, Y., Liu, A., Zhu, Y., Chen, S., Wei, D., Sun, J., Guo, Z., and Fan, H., 2020, Photoluminescence-tunable carbon dots from synergy effect of sulfur doping and water engineering, *Chem. Eng. J.*, 388, 124199.
- Gao, S., Wang, X., Xu, N., Lian, H., Xu, L., Zhang, W., and Xu, C., 2021, From coconut petiole residues to fluorescent carbon dots via a green hydrothermal method for Fe^{3+} detection, *Cellulose*, 28, 1647–1661.
- Gao, Z., Lin, Z., Chen, X., Zhong, H., and Huang, Z., 2016, Analytical Methods A fluorescent probe based on N-doped carbon dots for highly sensitive detection of Hg^{2+} in aqueous solutions, *Anal. Method*, 8, 2297–2304.
- González-González, R.B., González, L.T., Madou, M., Leyva-Porras, C., Martinez-Chapa, S.O., and Mendoza, A., 2022, Synthesis, Purification, and Characterization of Carbon Dots from Non-Activated and Activated Pyrolytic Carbon Black, *Nanomater.*, 12(3), 298.
- Guo, L., Li, L., Liu, M., Wan, Q., Tian, J., Huang, Q., Wen, Y., Liang, S., Zhang, X., and Wei, Y., 2018, Bottom-up preparation of nitrogen doped carbon quantum dots with green emission under microwave-assisted hydrothermal treatment and their biological imaging, *Mater. Sci. Eng. C*, 84, 60–66.
- Habiba, K., Makarov, V.I., Avalos, J., Guinel, M.J.F., Weiner, B.R., and Morell, G., 2013, Luminescent graphene quantum dots fabricated by pulsed laser synthesis, *Carbon N. Y.*, 64, 341–350.
- Han, X., Li, S., Peng, Z., Al-Yuobi, A.O., Bashammakh, A.S.O., El-Shahawi, M.S., and Leblanc, R.M., 2016, Interactions between carbon nanomaterials and biomolecules, *J. Oleo Sci.*, 65, 1–7.
- He, C., Xu, P., Zhang, X., and Long, W., 2022, The synthetic strategies, photoluminescence mechanisms and promising applications of carbon dots: Current state and future perspective, *Carbon N. Y.*, 186, 91–127.
- Hong, D., Deng, X., Liang, J., Li, J., Tao, Y., and Tan, K., 2019, One-step hydrothermal synthesis of down/up-conversion luminescence F-doped carbon quantum dots for label-free detection of Fe^{3+} , *Microchem. J.*, 151, 104217.
- Howe, J.Y., Rawn, C.J., Jones, L.E., and Ow, H., 2003, Improved crystallographic data for graphite, *Powder Diff.*, 18, 150–154.
- Hu, Y., Gao, Z., Yang, J., Chen, H., and Han, L., 2019, Environmentally benign conversion of waste polyethylene terephthalate to fluorescent carbon dots for “on-off-on” sensing of ferric and pyrophosphate ions, *J. Colloid Interface Sci.*, 538, 481–488.
- Hu, Y., Yang, J., Tian, J., Jia, L., and Yu, J.S., 2014, Green and size-controllable synthesis of photoluminescent carbon nanoparticles from waste plastic bags, *RSC Adv.*, 4, 47169–47176.

- Isnaeni, Herbani, Y., and Suliyanti, M.M., 2018, Concentration effect on optical properties of carbon dots at room temperature, *J. Lumin.*, 198, 215–219.
- Issa, M.A., Zentou, H., Jabbar, Z.H., Abidin, Z.Z., Harun, H., Halim, N.A.A., Alkhabet, M.M., and Pudza, M.Y., 2022, Ecofriendly adsorption and sensitive detection of Hg(II) by biomass-derived nitrogen-doped carbon dots: process modelling using central composite design, *Environ. Sci. Pollut. Res.*,.
- Kadian, S. and Manik, G., 2020, Sulfur doped graphene quantum dots as a potential sensitive fluorescent probe for the detection of quercetin, *Food Chem.*, 317, 126457.
- Kang, S., Kim, K.M., jung, K., Son, Y., Mhin, S., Ryu, J.H., Shim, K.B., Lee, B., Han, H.S., and Song, T., 2019, Graphene Oxide Quantum Dots Derived from Coal for Bioimaging: Facile and Green Approach, *Sci. Rep.*, 9, 1–7.
- Kansara, V., Shukla, R., Flora, S.J.S., Bahadur, P., and Tiwari, S., 2022, Graphene quantum dots: Synthesis, optical properties and navigational applications against cancer, *Mater. Today Commun.*, 31, 103359.
- Khavlyuk, P.D., Arefina, I.A., Bondarenko, D.P., Bogdanov, K. V., Stepanidenko, E.A., Baranov, A. V., Fedorov, A. V., Ushakova, E. V., Dubavik, A., and Rogach, A.L., 2019, Synthesis and energy structure of optical transitions of the nitrogen and sulfur co-doped carbon dots, *J. Phys. Conf. Ser.*, 1410.
- Koç, Ö.K., Üzer, A., and Apak, R., 2022, High Quantum Yield Nitrogen-Doped Carbon Quantum Dot-Based Fluorescent Probes for Selective Sensing of 2,4,6-Trinitrotoluene, *ACS Appl. Nano Mater.*, 5, 5868–5881.
- Kokorina, A.A., Sapelkin, A. V., Sukhorukov, G.B., and Goryacheva, I.Y., 2019, Luminescent carbon nanoparticles separation and purification, *Adv. Colloid Interface Sci.*, 274.
- Kongkeitkajorn, M.B., Sae-Kuay, C., and Reungsang, A., 2020, Evaluation of napier grass for bioethanol production through a fermentation process, *Processes*, 8.
- Krishnaiah, P., Atchudan, R., Perumal, S., Salama, E.S., Lee, Y.R., and Jeon, B.H., 2022, Utilization of waste biomass of *Poa pratensis* for green synthesis of n-doped carbon dots and its application in detection of Mn^{2+} and Fe^{3+} , *Chemosphere*, 286, 131764.
- Kumar, Y.R., Deshmukh, K., Sadasivuni, K.K., and Pasha, S.K.K., 2020, Graphene quantum dot based materials for sensing, bio-imaging and energy storage applications: a review, *RSC Adv.*, 10, 23861–23898.
- Kumila, B.N. and Liu, C., 2017, Analisa Pengaruh Reduksi Termal Terhadap Kerusakan Struktur (Structural-Disorder) Pada Lapisan Tipis Graphene Oxide Tereduksi, *Spektra J. Fis. dan Apl.*, 2, 67–74.
- Latief, U., ul Islam, S., Khan, Z.M.S.H., and Khan, M.S., 2021, A facile green synthesis of functionalized carbon quantum dots as fluorescent probes for a highly selective and sensitive detection of Fe^{3+} ions, *Spectrochim. Acta - Part*

A Mol. Biomol. Spectrosc., 262, 120132.

- Lee, J., Kim, K., Park, W.I., Kim, B.H., Park, J.H., Kim, T.H., Bong, S., Kim, C.H., Chae, G., Jun, M., Hwang, Y., Jung, Y.S., and Jeon, S., 2012, Uniform graphene quantum dots patterned from self-assembled silica nanodots, *Nano Lett.*, 12, 6078–6083.
- Li, C., Zhang, X., Zhang, W., Qin, X., and Zhu, C., 2019, Carbon quantum dots derived from pure solvent tetrahydrofuran as a fluorescent probe to detect pH and silver ion, *J. Photochem. Photobiol. A Chem.*, 382, 111981.
- Li, L.S., Jiao, X.Y., Zhang, Y., Cheng, C., Huang, K., and Xu, L., 2018, Green synthesis of fluorescent carbon dots from Hongcaitai for selective detection of hypochlorite and mercuric ions and cell imaging, *Sensors Actuators, B Chem.*, 263, 426–435.
- Li, Lingling, Li, Luyao, Chen, C.P., and Cui, F., 2017, Green synthesis of nitrogen-doped carbon dots from ginkgo fruits and the application in cell imaging, *Inorg. Chem. Commun.*, 86, 227–231.
- Li, Y., Liu, Y., Shang, X., Chao, D., Zhou, L., and Zhang, H., 2018, Highly sensitive and selective detection of Fe³⁺ by utilizing carbon quantum dots as fluorescent probes, *Chem. Phys. Lett.*, 705, 1–6.
- Li, Y., Shu, H., Wang, S., and Wang, J., 2015, Electronic and optical properties of graphene quantum dots: The role of many-body effects, *J. Phys. Chem. C*, 119, 4983–4989.
- Liang, S., Wang, M., Gao, W., and Zhao, X., 2022, Effects of elemental doping, acid treatment, and passivation on the fluorescence intensity and emission behavior of yellow fluorescence carbon dots, *Opt. Mater. (Amst.)*, 128, 112471.
- Liang, Y., Liu, Y., Li, S., Lu, B., Liu, C., Yang, H., Ren, X., and Hou, Y., 2019, Hydrothermal growth of nitrogen-rich carbon dots as a precise multifunctional probe for both Fe³⁺ detection and cellular bio-imaging, *Opt. Mater. (Amst.)*, 89, 92–99.
- Lim, S.Y., Shen, W., and Gao, Z., 2015, Carbon quantum dots and their applications, *Chem. Soc. Rev.*, 44, 362–381.
- Liu, C., Zhang, F., Hu, J., Gao, W., and Zhang, M., 2021, A Mini Review on pH-Sensitive Photoluminescence in Carbon Nanodots, *Front. Chem.*, 8, 1–9.
- Liu, H., Li, Z., Sun, Y., Geng, X., Hu, Y., Meng, H., Ge, J., and Qu, L., 2018, Synthesis of Luminescent Carbon Dots with Ultrahigh Quantum Yield and Inherent Folate Receptor-Positive Cancer Cell Targetability, *Sci. Rep.*, 8, 1–8.
- Liu, R., Li, H., Kong, W., Liu, J., Liu, Y., Tong, C., Zhang, X., and Kang, Z., 2013, Ultra-sensitive and selective Hg²⁺ detection based on fluorescent carbon dots, *Mater. Res. Bull.*, 48, 2529–2534.
- Liu, S., Tian, J., Wang, L., Zhang, Y., Qin, X., Luo, Y., Asiri, A.M., Al-Youbi,

- A.O., and Sun, X., 2012, Hydrothermal treatment of grass: A low-cost, green route to nitrogen-doped, carbon-rich, photoluminescent polymer nanodots as an effective fluorescent sensing platform for label-free detection of Cu(II) ions, *Adv. Mater.*, 24, 2037–2041.
- Liu, Y., Gong, X., Dong, W., Zhou, R., Shuang, S., and Dong, C., 2018, Nitrogen and phosphorus dual-doped carbon dots as a label-free sensor for Curcumin determination in real sample and cellular imaging, *Talanta*, 183, 61–69.
- Liu, Yang, Liu, Yanan, Park, M., Park, S.J., Zhang, Y., Akanda, M.R., Park, B.Y., and Kim, H.Y., 2017, Green synthesis of fluorescent carbon dots from carrot juice for in vitro cellular imaging, *Carbon Lett.*, 21, 61–67.
- López-Díaz, D., López Holgado, M., García-Fierro, J.L., and Velázquez, M.M., 2017, Evolution of the Raman Spectrum with the Chemical Composition of Graphene Oxide, *J. Phys. Chem. C*, 121, 20489–20497.
- Lou, Y., Ji, J., Qin, A., Liao, L., Li, Z., Chen, S., Zhang, K., and Ou, J., 2020, Cane Molasses Graphene Quantum Dots Passivated by PEG Functionalization for Detection of Metal Ions, *ACS Omega*, 5, 6763–6772.
- Ma, C., Yin, C., Fan, Y., Yang, X., and Zhou, X., 2019, Highly efficient synthesis of N-doped carbon dots with excellent stability through pyrolysis method, *J. Mater. Sci.*, 54, 9372–9384.
- Ma, X., Li, S., Hessel, V., Lin, L., Meskers, S., and Gallucci, F., 2019, Synthesis of luminescent carbon quantum dots by microplasma process, *Chem. Eng. Process. - Process Intensif.*, 140, 29–35.
- Malavika, J.P., Shobana, C., Ragupathi, M., Kumar, P., Lee, Y.S., Govarthanan, M., and Selvan, R.K., 2021, A sustainable green synthesis of functionalized biocompatible carbon quantum dots from Aloe barbadensis Miller and its multifunctional applications, *Environ. Res.*, 200, 111414.
- Manioudakis, J., Victoria, F., Thompson, C.A., Brown, L., Movsum, M., Lucifero, R., and Naccache, R., 2019, Effects of nitrogen-doping on the photophysical properties of carbon dots, *J. Mater. Chem. C*, 7, 853–862.
- Mansuriya, B.D., 2021, Carbon Dots : Classification , Properties , Synthesis , Characterization , and Applications in Health Care — An Updated Review, *Nanomaterials*, 11(10), 25-25.
- Marpongahtun, M., Andriyani, A., Muis, Y., Gea, S., Amaturrehman, S.A., Attaurrazaq, B., and Daulay, A., 2023, Synthesis of Nitrogen-Doped Carbon Dots from Nanocrystalline Cellulose by Pyrolysis Method as Hg²⁺ Detector, *Int. J. Technol.*, 14, 219.
- Martins, E.C., Santana, E.R., and Spinelli, A., 2023, Nitrogen and sulfur co-doped graphene quantum dot-modified electrode for monitoring of multivitamins in energy drinks, *Talanta*, 252, 123836.
- McKittrick, J. and Shea-Rohwer, L.E., 2014, Review: Down conversion materials for solid-state lighting, *J. Am. Ceram. Soc.*, 97, 1327–1352.

- Mehta, V.N., Jha, S., and Kailasa, S.K., 2014, One-pot green synthesis of carbon dots by using *Saccharum officinarum* juice for fluorescent imaging of bacteria (*Escherichia coli*) and yeast (*Saccharomyces cerevisiae*) cells, *Mater. Sci. Eng. C*, 38, 20–27.
- Meiling, T.T., 2017, Development of a reliable and environmentally friendly synthesis for fluorescence carbon nanodots, *Univ. Potsdam*, 25–198.
- Meng, W., Bai, X., Wang, B., Liu, Z., Lu, S., and Yang, B., 2019, Biomass-Derived Carbon Dots and Their Applications, *Energy Environ. Mater.*, 2, 172–192.
- Mintz, K.J., Bartoli, M., Rovere, M., Zhou, Y., Hettiarachchi, S.D., Paudyal, S., Chen, J., Domena, J.B., Liyanage, P.Y., Sampson, R., Khadka, D., Pandey, R.R., Huang, S., Chusuei, C.C., Tagliaferro, A., and Leblanc, R.M., 2021, A deep investigation into the structure of carbon dots, *Carbon N. Y.*, 173, 433–447.
- Murugan, N., Prakash, M., Jayakumar, M., Sundaramurthy, A., and Sundramoorthy, A.K., 2019, Green synthesis of fluorescent carbon quantum dots from *Eleusine coracana* and their application as a fluorescence ‘turn-off’ sensor probe for selective detection of Cu^{2+} , *Appl. Surf. Sci.*, 476, 468–480.
- Nair, R. V., Thomas, R.T., Sankar, V., Muhammad, H., Dong, M., and Pillai, S., 2017, Rapid, Acid-Free Synthesis of High-Quality Graphene Quantum Dots for Aggregation Induced Sensing of Metal Ions and Bioimaging, *ACS Omega*, 2, 8051–8061.
- Nazri, N.A.A., Azeman, N.H., Luo, Y., and A Bakar, A.A., 2021, Carbon quantum dots for optical sensor applications: A review, *Opt. Laser Technol.*, 139, 106928.
- Nguyen, K.G., Baragau, I.A., Gromicova, R., Nicolaev, A., Thomson, S.A.J., Rennie, A., Power, N.P., Sajjad, M.T., and Kellici, S., 2022, Investigating the effect of N-doping on carbon quantum dots structure, optical properties and metal ion screening, *Sci. Rep.*, 12, 1–12.
- Niu, W.J., Li, Y., Zhu, R.H., Shan, D., Fan, Y.R., and Zhang, X.J., 2015, Ethylenediamine-assisted hydrothermal synthesis of nitrogen-doped carbon quantum dots as fluorescent probes for sensitive biosensing and bioimaging, *Sensors Actuators, B Chem.*, 218, 229–236.
- Ogi, T., Aishima, K., Permatasari, F.A., Iskandar, F., Tanabe, E., and Okuyama, K., 2016, Kinetics of nitrogen-doped carbon dot formation: Via hydrothermal synthesis, *New J. Chem.*, 40, 5555–5561.
- Ozyurt, D., Kobaisi, M. Al, Hocking, R.K., and Fox, B., 2023, Properties, synthesis, and applications of carbon dots: A review, *Carbon Trends*, 12.
- Park, S.Y., Lee, H.U., Park, E.S., Lee, S.C., Lee, J.W., Jeong, S.W., Kim, C.H., Lee, Y.C., Huh, Y.S., and Lee, J., 2014, Photoluminescent green carbon nanodots from food-waste-derived sources: Large-scale synthesis, properties, and biomedical applications, *ACS Appl. Mater. Interfaces*, 6, 3365–3370.

- Picard, M., Thakur, S., Misra, M., and Mohanty, A.K., 2019, Miscanthus grass-derived carbon dots to selectively detect Fe^{3+} ions, *RSC Adv.*, 9, 8628–8637.
- Purbia, R. and Paria, S., 2016, A simple turn on fluorescent sensor for the selective detection of thiamine using coconut water derived luminescent carbon dots, *Biosens. Bioelectron.*, 79, 467–475.
- Qi, H., Teng, M., Liu, M., Liu, S., Li, J., Yu, H., Teng, C., Huang, Z., Liu, H., Shao, Q., Umar, A., Ding, T., Gao, Q., and Guo, Z., 2019, Biomass-derived nitrogen-doped carbon quantum dots: highly selective fluorescent probe for detecting Fe^{3+} ions and tetracyclines, *J. Colloid Interface Sci.*, 539, 332–341.
- Qu, D., Wang, X., Bao, Y., and Sun, Z., 2020, Recent advance of carbon dots in bio-related applications, *JPhys Materials.*, 3, 022003.
- Radhakrishnan, K., Sivanesan, S., and Panneerselvam, P., 2020, Turn-On fluorescence sensor based detection of heavy metal ion using carbon dots@graphitic-carbon nitride nanocomposite probe, *J. Photochem. Photobiol. A Chem.*, 389, 112204.
- Ren, H., Wang, C., Zhang, Jiali, Zhou, X., Xu, D., Zheng, J., Guo, S., and Zhang, Jingyan, 2010, DNA cleavage system of nanosized graphene oxide sheets and copper ions, *ACS Nano*, 4, 7169–7174.
- Ren, S., Cui, M., Chen, X., Mei, S., and Qiang, Y., 2022, Comparative study on corrosion inhibition of N doped and N,S codoped carbon dots for carbon steel in strong acidic solution, *J. Colloid Interface Sci.*, 628, 384–397.
- Robertson, A.W. and Warner, J.H., 2011, Hexagonal single crystal domains of few-layer graphene on copper foils, *Nano Lett.*, 11, 1182–1189.
- Robertson, J., 2002, Diamond-like amorphous carbon, *Mater. Sci. Eng. R Rep.* 37, 129–281.
- Roy, P., Chen, P.C., Periasamy, A.P., Chen, Y.N., and Chang, H.T., 2015, Photoluminescent carbon nanodots: Synthesis, physicochemical properties and analytical applications, *Mater. Today*, 18, 447–458.
- Ru, G.J., Xin, Q., Rui, J.X., and Shah, H., 2019, Single precursor-based luminescent nitrogen-doped carbon dots and their application for iron (III) sensing, *Arab. J. Chem.*, 12, 1083–1091.
- Sabet, M. and Mahdavi, K., 2019, Green synthesis of high photoluminescence nitrogen-doped carbon quantum dots from grass via a simple hydrothermal method for removing organic and inorganic water pollutions, *Appl. Surf. Sci.*, 463, 283–291.
- Sakdaronnarong, C., Sangjan, A., Boonsith, S., Kim, D.C., and Shin, H.S., 2020, Recent developments in synthesis and photocatalytic applications of carbon dots, *Catalysts*, 10, .
- Sangam, S., Gupta, A., Shakeel, A., Bhattacharya, R., Sharma, A.K., Suhag, D., Chakrabarti, S., Garg, S.K., Chattopadhyay, S., Basu, B., Kumar, V., Rajput,

- S.K., Dutta, M.K., and Mukherjee, M., 2018, Sustainable synthesis of single crystalline sulphur-doped graphene quantum dots for bioimaging and beyond, *Green Chem.*, 20, 4245–4259.
- Sari, F.D., Chotimah, Roto, and Kartini, I., 2023, Highly fluorescent nitrogen-doped graphene quantum dots (N-GQDs) synthesized from *Pennisetum purpureum* for selective and sensitive detection of Fe^{3+} ions, *Mater. Res. Express*, 10, 075603.
- Sari, N.K., 2018, Pembuatan bioetanol dari rumput gajah dengan distilasi batch, *J. Tek. Kim. Indones.*, 8, 94.
- Shahdeo, D., Roberts, A., Abbineni, N., and Gandhi, S., 2020, Graphene based sensors, *Compr. Anal. Chem.*, 91, 175-199.
- Sharma, A., Gadly, T., Neogy, S., Ghosh, S.K., and Kumbhakar, M., 2017, Addition to “Molecular Origin and Self-Assembly of Fluorescent Carbon Nanodots in Polar Solvents,” *J. Phys. Chem. Lett.*, 8, 5861–5864.
- Sharma, S., Umar, A., Sood, S., Mehta, S.K., and Kansal, S.K., 2018, Photoluminescent C-dots: An overview on the recent development in the synthesis, physiochemical properties and potential applications, *J. Alloys Compd.*, 748, 818–853.
- Shen, C.L., Lou, Q., Liu, K.K., Dong, L., and Shan, C.X., 2020, Chemiluminescent carbon dots: Synthesis, properties, and applications, *Nano Today*, 35, 100954.
- Shen, J., Shang, S., Chen, X., Wang, D., and Cai, Y., 2017, Facile synthesis of fluorescence carbon dots from sweet potato for Fe^{3+} sensing and cell imaging, *Mater. Sci. Eng. C*, 76, 856–864.
- Strezov, V., Evans, T.J., and Hayman, C., 2008, Thermal conversion of elephant grass (*Pennisetum Purpureum Schum.*) to bio-gas, bio-oil and charcoal, *Bioresour. Technol.*, 99, 8394–8399.
- Sun, C., Zhang, Y., Wang, P., Yang, Y., Wang, Yu, Xu, J., Wang, Yiding, and Yu, W.W., 2016, Synthesis of Nitrogen and Sulfur Co-doped Carbon Dots from Garlic for Selective Detection of Fe^{3+} , *Nanoscale Res. Lett.*, 11, 1–9.
- Sun, D., Ban, R., Zhang, P.H., Wu, G.H., Zhang, J.R., and Zhu, J.J., 2013, Hair fiber as a precursor for synthesizing of sulfur- and nitrogen-co-doped carbon dots with tunable luminescence properties, *Carbon N. Y.*, 64, 424–434.
- Sun, F., Ghosh, H., Tan, Z., and Sivoththaman, S., 2023, Top-down synthesis and enhancing device adaptability of graphene quantum dots, *Nanotechnology*, 34, 185601.
- Tang, J., Zhang, J., Zhang, W., Xiao, Y., Shi, Y., Kong, F., and Xu, W., 2021, Modulation of red-light emission from carbon quantum dots in acid-based environment and the detection of chromium (III) ions, *J. Mater. Sci. Technol.*, 83, 58–65.
- Tang, J., Zhang, J., Zhang, Y., Xiao, Y., Shi, Y., Chen, Y., Ding, L., and Xu, W.,

- 2019, Influence of Group Modification at the Edges of Carbon Quantum Dots on Fluorescent Emission, *Nanoscale Res. Lett.*, 14, .
- Torres Landa, S.D., Reddy Bogireddy, N.K., Kaur, I., Batra, V., and Agarwal, V., 2022, Heavy metal ion detection using green precursor derived carbon dots, *iScience*, 25, 103816.
- Truskewycz, A., Yin, H., Halberg, N., Lai, D.T.H., Ball, A.S., Truong, V.K., Rybicka, A.M., and Cole, I., 2022, Carbon Dot Therapeutic Platforms: Administration, Distribution, Metabolism, Excretion, Toxicity, and Therapeutic Potential, *Small*, 18, 2106342.
- Tyagi, A., Tripathi, K.M., Singh, N., Choudhary, S., and Gupta, R.K., 2016, Green synthesis of carbon quantum dots from lemon peel waste: Applications in sensing and photocatalysis, *RSC Adv.*, 6, 72423–72432.
- Valero, M., López-Cornejo, M.P., and Costa, S.M.B., 2007, Effect of the structure and concentration of cyclodextrins in the quenching process of naproxen, *J. Photochem. Photobiol. A Chem.*, 188, 5–11.
- Wang, C., Xu, Z., Cheng, H., Lin, H., Humphrey, M.G., and Zhang, C., 2015, A hydrothermal route to water-stable luminescent carbon dots as nanosensors for pH and temperature, *Carbon N. Y.*, 82, 87–95.
- Wang, H., Gao, P., Wang, Y., Guo, J., Zhang, K.Q., Du, D., Dai, X., and Zou, G., 2015, Fluorescently tuned nitrogen-doped carbon dots from carbon source with different content of carboxyl groups, *APL Mater.*, 3, 1–8.
- Wang, M., Wan, Y., Zhang, K., Fu, Q., Wang, L., Zeng, J., Xia, Z., and Gao, D., 2019, Green synthesis of carbon dots using the flowers of *Osmanthus fragrans* (Thunb.) Lour. as precursors: application in Fe^{3+} and ascorbic acid determination and cell imaging, *Anal. Bioanal. Chem.*, 2715–2727.
- Wang, N., Wang, Y., Guo, T., Yang, T., Chen, M., and Wang, J., 2016, Green preparation of carbon dots with papaya as carbon source for effective fluorescent sensing of Iron (III) and *Escherichia coli*, *Biosens. Bioelectron.*, 85, 68–75.
- Wang, Y. and Hu, A., 2014, Carbon quantum dots: Synthesis, properties and applications, *J. Mater. Chem. C*, 2, 6921–6939.
- Wang, Zihao, Chen, D., Gu, B., Gao, B., Wang, T., Guo, Q., and Wang, G., 2020, Biomass-derived nitrogen doped graphene quantum dots with color-tunable emission for sensing, fluorescence ink and multicolor cell imaging, *Spectrochim. Acta - Part A Mol. Biomol. Spectrosc.*, 227, 117671.
- Wang, Zhengdi, Hu, T., Liang, R., and Wei, M., 2020, Application of Zero-Dimensional Nanomaterials in Biosensing, *Front. Chem.*, 8, 1–19.
- Wen, J., Li, N., Li, D., Zhang, M., Lin, Y., Liu, Z., Lin, X., and Shui, L., 2021, Cesium-Doped Graphene Quantum Dots as Ratiometric Fluorescence Sensors for Blood Glucose Detection, *ACS Appl. Nano Mater.*, 4, 8437–8446.

- Widiyastuti, T., Hidayat, N., and Indrasanti, D., 2014, Nutrient Content of Napier Grass (*Pennisetum purpureum*) Silage Made with Various Additive and Modified Atmosphere in The Silo, *Anim. Prod.*, 16, 11–17.
- Wong, K.L., Bünzli, J.C.G., and Tanner, P.A., 2020, Quantum yield and brightness, *J. Lumin.*, 224, 117256.
- Wu, P., Li, W., Wu, Q., Liu, Y., and Liu, S., 2017, Hydrothermal synthesis of nitrogen-doped carbon quantum dots from microcrystalline cellulose for the detection of Fe^{3+} ions in an acidic environment, *RSC Adv.*, 7, 44144–44153.
- Wu, Q., Li, W., Wu, P., Li, J., Liu, S., and Zhan, X., 2015, RSC Advances carbon nanodots and their visible-light, 75711–75721.
- Xia, C., Zhu, S., Feng, T., Yang, M., and Yang, B., 2019, Evolution and Synthesis of Carbon Dots: From Carbon Dots to Carbonized Polymer Dots, *Adv. Sci.*, 6, 1901316.
- Xie, Y., Cheng, D., Liu, X., and Han, A., 2019, Green hydrothermal synthesis of N-doped carbon dots from biomass highland barley for the detection of Hg^{2+} , *Sensors (Switzerland)*, 19(14), 3169.
- Xu, D., Lei, F., Chen, H., Yin, L., Shi, Y., and Xie, J., 2019, properties of self-quenching-resistant carbon dots, *RSC Adv.*, 9, 8290–8299.
- Xu, X., Ray, R., Gu, Y., Ploehn, H.J., Gearheart, L., Raker, K., and Scrivens, W.A., 2004, Electrophoretic analysis and purification of fluorescent single-walled carbon nanotube fragments, *J. Am. Chem. Soc.*, 126, 12736–12737.
- Yahyazadeh, E. and Shemirani, F., 2019, Easily synthesized carbon dots for determination of mercury(II) in water samples, *Heliyon*, 5, e01596.
- Yang, H.L., Bai, L.F., Geng, Z.R., Chen, H., Xu, L.T., Xie, Y.C., Wang, D.J., Gu, H.W., and Wang, X.M., 2023, Carbon quantum dots: Preparation, optical properties, and biomedical applications, *Mater. Today Adv.*, 18, 100376.
- Yao, Q., Wu, H., Jin, Y., Wang, C., Zhang, R., Lin, Y., Wu, S., and Hu, Y., 2022, One-pot synthesis of fluorescent nitrogen-doped graphene quantum dots for portable detection of iron ion, *Curr. Appl. Phys.*, 41, 191–199.
- Yen, Y., Lin, Y., Chen, T., Chyueh, S., and Chang, H., 2019, Carbon dots functionalized papers for high-throughput sensing of 4-chloroethcathinone and its analogues in crime sites,.
- Yoo, D., Park, Y., Cheon, B., and Park, M.H., 2019, Carbon Dots as an Effective Fluorescent Sensing Platform for Metal Ion Detection, *Nanoscale Res. Lett.*, 14, 272.
- Yoo, H.J., Kwak, B.E., and Kim, D.H., 2021, Competition of the roles of π -conjugated domain between emission center and quenching origin in the photoluminescence of carbon dots depending on the interparticle separation, *Carbon N. Y.*, 183, 560–570.
- Yu, C., Xuan, T., Chen, Y., Zhao, Z., Sun, Z., and Li, H., 2015, A facile, green

synthesis of highly fluorescent carbon nanoparticles from oatmeal for cell imaging, *J. Mater. Chem. C*, 3, 9514–9518.

- Zhao, C., Song, X., Liu, Y., Fu, Y., Ye, L., Wang, N., Wang, F., Li, L., Mohammadniaei, M., Zhang, M., Zhang, Q., and Liu, J., 2020, Synthesis of graphene quantum dots and their applications in drug delivery, 18, 142.
- Zhao, L., Wang, Y., Zhao, X., Deng, Y., and Xia, Y., 2019, Facile synthesis of nitrogen-doped carbon quantum dots with chitosan for fluorescent detection of Fe^{3+} , *Polymers (Basel)*, 11, 1–12.
- Zhao, S., Lan, M., Zhu, X., Xue, H., Ng, T.W., Meng, X., Lee, C.S., Wang, P., and Zhang, W., 2015, Green Synthesis of Bifunctional Fluorescent Carbon Dots from Garlic for Cellular Imaging and Free Radical Scavenging, *ACS Appl. Mater. Interfaces*, 7, 17054–17060.
- Zhou, H., Ren, Y., Li, Zheng, He, W., and Li, Zhengxin, 2022, Selective Detection of Fe^{3+} by Nitrogen–Sulfur-Doped Carbon Dots Using Thiourea and Citric Acid, *Coatings*, 12 (8), 1042.
- Zhu, P., Tan, K., Chen, Q., Xiong, J., and Gao, L., 2019, Origins of Efficient Multiemission Luminescence in Carbon Dots, *Chem. Mater.*, 31, 4732–4742.
- Zhu, Q., Mao, H., Li, J., Hua, J., Wang, J., Yang, R., and Li, Z., 2021, A glycine-functionalized graphene quantum dots synthesized by a facile post-modification strategy for a sensitive and selective fluorescence sensor of mercury ions, *Spectrochim. Acta - Part A Mol. Biomol. Spectrosc.*, 247, 119090.
- Zhu, S., Song, Y., Zhao, X., Shao, J., Zhang, J., and Yang, B., 2015, The photoluminescence mechanism in carbon dots (graphene quantum dots, carbon nanodots, and polymer dots): current state and future perspective, *Nano Res.*, 8, 355–381.
- Zhu, X., Zhang, Z., Xue, Z., Huang, C., Shan, Y., Liu, C., Qin, X., Yang, W., Chen, X., and Wang, T., 2017, Understanding the Selective Detection of Fe^{3+} Based on Graphene Quantum Dots as Fluorescent Probes: The K_{sp} of a Metal Hydroxide-Assisted Mechanism, *Anal. Chem.*, 89, 12054–12058.
- Zu, F., Yan, F., Bai, Z., Xu, J., Wang, Y., Huang, Y., and Zhou, X., 2017, The quenching of the fluorescence of carbon dots: A review on mechanisms and applications, *Microchim. Acta*, 184, 1899–1914.
- Zulfajri, M., Gedda, G., Chang, C.J., Chang, Y.P., and Huang, G.G., 2019, Cranberry Beans Derived Carbon Dots as a Potential Fluorescence Sensor for Selective Detection of Fe^{3+} Ions in Aqueous Solution, *ACS Omega*, 4, 15382–15392.