



DAFTAR PUSTAKA

- Abdullah, N. I. S. B., Ahmad, M. B., dan Shameli, K. (2015). Biosynthesis of silver nanoparticles using *Artocarpus elasticus* stem bark extract. *Chemistry Central Journal*, 9(1), 1–7.
- Abid, H. A., dan Al-Rashid, S. N. T. (2020). Study of the effect of nanoparticle size on the dielectric constant and concentration of charge carriers of Si and CDS materials. *Chalcogenide Letters*, 17(12), 623–629.
- A. De Caro, C. (2015). UV-Vis spectrophotometry. *Mettler-Toledo International, September 2015*, 4–14.
- Ahmad, A., Mukherjee, P., Senapati, S., Mandal, D., Khan, M. I., Kumar, R., dan Sastry, M. (2003). Extracellular biosynthesis of silver nanoparticles using the fungus *Fusarium oxysporum*. *Colloids and Surfaces B: Biointerfaces*, 28(4), 313–318.
- Alahmad, A., Feldhoff, A., Bigall, N. C., Rusch, P., Scheper, T., dan Walter, J. G. (2021). Hypericum perforatum L-mediated green-synthesis of silver nanoparticles exhibiting antioxidant and anticancer activities. *Nanomaterials*, 11(2), 1–26.
- Alarcon, E. I., dan Griffith, M. (2015). Silver nanoparticle applications. In *Springer International Publishing*.
- Aldosari, F. M. M. (2022). Characterization of labeled gold nanoparticles for surface-enhanced Raman scattering. *Molecules*, 27(3).
- Al-Hada, N. M., Al-Ghaili, A. M., Kasim, H., Saleh, M. A., Flaifel, M. H., Kamari, H. M., Baqiah, H., Liu, J., dan Jihua, W. (2020). The effect of PVP concentration on particle size, morphological and optical properties of cassiterite nanoparticles. *IEEE Access*, 8(May), 93444–93454.
- Alibe, I. M., Matori, K. A., Sidek, H. A. A., Yaakob, Y., Rashid, U., Alibe, A. M., Zaid, M. H. M., Nasir, S., dan Nasir, M. M. (2019). Effects of polyvinylpyrrolidone on structural and optical properties of willemite semiconductor nanoparticles by polymer thermal treatment method. *Journal of Thermal Analysis and Calorimetry*, 136(6), 2249–2268.
- Allen, E., Smith, P., dan Henshaw, J. (2001). Prepared for a review of particle agglomeration. *AEA Technology*, 20166(1).
- Al-Saidi, W. A., Feng, H., dan Fichthorn, K. A. (2012). Adsorption of polyvinylpyrrolidone on Ag surfaces: Insight into a structure-directing agent. *Nano Letters*, 12(2), 997–1001.



- Alzahrani, E. (2020). Colorimetric detection based on localized surface plasmon resonance optical characteristics for sensing of mercury using green-synthesized silver nanoparticles. *Journal of Analytical Methods in Chemistry*, 2020.
- Amirjani, A., Firouzi, F., dan Haghshenas, D. F. (2020). Predicting the size of silver nanoparticles from their optical properties. *Plasmonics*, 15(4), 1077–1082.
- Bae, C. H., Nam, S. H., dan Park, S. M. (2002). Formation of silver nanoparticles by laser ablation of a silver target in NaCl solution. *Applied Surface Science*, 197–198, 628–634.
- Baganizi, D. R., Nyairo, E., Duncan, S. A., Singh, S. R., dan Dennis, V. A. (2017). Interleukin-10 conjugation to carboxylated PVP-coated silver nanoparticles for improved stability and therapeutic efficacy. *Nanomaterials*, 7(7).
- Balbinot, S., Srivastav, A. M., Vidic, J., Abdulhalim, I., dan Manzano, M. (2021). Plasmonic biosensors for food control. *Trends in Food Science and Technology*, 111(March), 128–140.
- Banerjee, S., Saha, A. K., Show, B., Ganguly, J., Bhattacharyay, R., Datta, S. K., Saha, H., dan Mukherjee, N. (2015). A regular rippled pattern formed by the molecular self-organization of polyvinylpyrrolidone encapsulated Ag nanoparticles: A high transmissive coating for efficiency enhancement of cSi solar cells. *RSC Advances*, 5(8), 5667–5673.
- Banwell, C. N., dan Elaine M. McCash. 1994. Fundamentals of molecular spectroscopy. *McGraw-Hill*.
- Berglind, E., Thylén, L., dan Liu, L. (2010). Plasmonic/metallic passive waveguides and waveguide components for photonic dense integrated circuits: A feasibility study based on microwave engineering. *IET Optoelectronics*, 4(1), 1–16.
- Bindhu, M. R., dan Umadevi, M. (2014). Surface plasmon resonance optical sensor and antibacterial activities of biosynthesized silver nanoparticles. *Spectrochimica Acta-Part A: Molecular and Biomolecular Spectroscopy*, 121, 596–604.
- Bindhu, M. R., dan Umadevi, M. (2014). Silver and gold nanoparticles for sensor and antibacterial applications. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 128, 37–45.
- Bindhu, M. R., Umadevi, M., Esmail, G. A., Al-Dhabi, N. A., dan Arasu, M. V. (2020). Green-synthesis and characterization of silver nanoparticles from *Moringa oleifera* flower and assessment of antimicrobial and sensing properties. *Journal of Photochemistry and Photobiology B: Biology*, 205(January), 111836.
- Bradley, J. S. (1994). The chemistry of transition metal colloids. *Clusters and*



Colloids: From Theory to Applications, 459–544.

- Bradley, J. S., Tesche, B., Busser, W., Maase, M., dan Reetz, M. T. (2000). Surface spectroscopic study of the stabilization mechanism for shape-selectively synthesized nanostructured transition metal colloids. *Journal of the American Chemical Society*, 122(19), 4631–4636.
- Brian, M. O., Hemachitra, P., Deepa, R., dan Senthamarai Selvi, V. (2016). Synthesis of silver nanoparticles and its antibacterial activity from *Moringa oleifera*, *Murraya koingii* and *Ocimum sanctum* against *E. coli* and *S. aureus*. *Der Pharmacia Lettre*, 8(10), 150–160.
- Burtovyy, R., dan Luzinov, I. (2008). Reversibility of pH-induced dewetting of poly(vinylpyridine) thin films on silicon oxide substrate. *Langmuir*, 24(11), 5903–5910.
- Carmona, E. R., Benito, N., Plaza, T., dan Recio-Sánchez, G. (2017). Green-synthesis of silver nanoparticles by using leaf extracts from the endemic *Buddleja globosa* hope. *Green Chemistry Letters and Reviews*, 10(4), 250–256.
- Cöpel, W. (1993). Biosensors: Theory and applications. *Von D. G. Buerk. Technomic Publishing Company, Lancaster, 1993. 219 S., geb., SFr. 187,-. ISBN 0-87762-975-7. Nachrichten Aus Chemie, Technik Und Laboratorium*, 41(10), 1156–1157.
- Chang, C. C. (2021). Recent advancements in aptamer-based surface plasmon resonance biosensing strategies. *Biosensors*, 11(7).
- Chen, M., He, Y., Wang, X., dan Hu, Y. (2018). Numerically investigating the optical properties of plasmonic metallic nanoparticles for effective solar absorption and heating. *Solar Energy*, 161(October 2017), 17–24.
- Chen, H., Qi, F., Zhou, H., Jia, S., Gao, Y., Koh, K., dan Yin, Y. (2015). Fe₃O₄@Au nanoparticles as a means of signal enhancement in surface plasmon resonance spectroscopy for thrombin detection. *Sensors and Actuators, B: Chemical*, 212, 505–511.
- Dakal, T. C., Kumar, A., Majumdar, R. S., dan Yadav, V. (2016). Mechanistic basis of antimicrobial actions of silver nanoparticles. *Frontiers in Microbiology*, 7(NOV), 1–17.
- Das, S., Parida, U. K., Birendra, dan Bindhani, K. (2013). Green biosynthesis of silver nanoparticles using *Moringa oleifera* L. Leaf. *International Journal of Nanotechnology and Application*, 3(2), 2277–4777.
- Eid, S. M., Hassan, S. A., Nashat, N. W., Elghobashy, M. R., Abbas, S. S., dan Moustafa, A. A. (2021). Optimization of localized surface plasmon resonance hot spots in surface-enhanced infrared absorption spectroscopy aluminum substrate as an optical sensor coupled to chemometric tools for the purity assay of quinary mixtures. *Microchimica Acta*, 188(6).



- Egerton, R. F. (2005). Physical principles of electron microscopy. *Springer*, 148.
- El-Khadragy, M., Alolayan, E. M., Metwally, D. M., El-Din, M. F. S., Alobud, S. S., Alsultan, N. I., Alsaif, S. S., Awad, M. A., dan Moneim, A. E. A. (2018). Clinical efficacy associated with enhanced antioxidant enzyme activities of silver nanoparticles biosynthesized using *Moringa oleifera* leaf extract, against Cutaneous leishmaniasis in a murine model of leishmania major. *International Journal of Environmental Research and Public Health*, 15(5).
- El-Rahman, T. (2016). Environmentally friendly synthesis of silver nanoparticles using *Moringa oleifera* (Lam) leaf extract and their antibacterial activity against some important pathogenic bacteria. *Mycopath*, 13(1).
- Ermakova, E., Raitman, O., Shokurov, A., Kalinina, M., Selector, S., Tsivadze, A., Arslanov, V., Meyer, M., Bessmertnykh-Lemeune, A., dan Guilard, R. (2016). A metal-responsive interdigitated bilayer for selective quantification of mercury(II) traces by surface plasmon resonance. *Analyst*, 141(6), 1912–1917.
- Fatimah, I., dan Aftrid, Z. H. V. I. (2019). Characteristics and antibacterial activity of green synthesized silver nanoparticles using red spinach (*Amaranthus tricolor* L) leaf extract. *Green Chemistry Letters and Reviews*, 12(1), 25–30.
- Fox, M. (2010). Optical properties of solids 2nd edition, UK: *Oxford University Press*.
- Fu, E., Ramsey, S. A., dan Yager, P. (2007). Dependence of the signal amplification potential of colloidal gold nanoparticles on resonance wavelength in surface plasmon resonance-based detection. *Analytica Chimica Acta*, 599(1), 118–123.
- Gandomi, Y. A., Aaron, D. S., Houser, J. R., Daugherty, M. C., Clement, J. T., Pezeshki, A. M., Ertugrul, T. Y., Moseley, D. P., dan Mench, M. M. (2018). Critical review experimental diagnostics and material characterization techniques used on redox flow batteries. *Journal of The Electrochemical Society*, 165(5), A970–A1010.
- Gharibshahi, L., Saion, E., Gharibshahi, E., Shaari, A. H., dan Matori, K. A. (2017). Structural and optical properties of ag nanoparticles synthesized by thermal treatment method. *Materials*, 10(4), 402.
- Gharibshahi, L., Saion, E., Gharibshahi, E., Shaari, A. H., dan Matori, K. A. (2017). Influence of poly(vinylpyrrolidone) concentration on properties of silver nanoparticles manufactured by modified thermal treatment method. *PLoS ONE*, 12(10), 1–17.
- Gharibshahi, E., dan Saion, E. (2012). Influence of dose on particle size and optical properties of colloidal platinum nanoparticles. *International Journal of Molecular Sciences*, 13(11), 14723–14741.



- Ghodsela, T., Neishaboor, T., dan Vesaghi, M. A. (2011). Synthesis of silver nanoparticles array and application of their localized surface plasmon resonance in biosensor design. *Biosensors*, 2(January 2015), 59–61.
- Gilbert, A. S. (2017). IR spectral group frequencies of organic compounds. In encyclopedia of spectroscopy and spectrometry (3rd ed.). Elsevier Ltd.
- Girma, W. M., Fahmi, M. Z., Permadi, A., Abate, M. A., dan Chang, J. Y. (2017). Synthetic strategies and biomedical applications of I-III-VI ternary quantum dots. *Journal of Materials Chemistry B*, 5(31), 6193–6216.
- Goubet, N., Yan, C., Polli, D., Portalès, H., Arfaoui, I., Cerullo, G., dan Pilani, M. P. (2013). Modulating physical properties of isolated and self-assembled nanocrystals through change in nanocrystallinity. *Nano Letters*, 13(2), 504–508.
- Guo, X. (2014). Fe₃O₄@Au nanoparticles enhanced surface plasmon resonance for ultrasensitive immunoassay. *Sensors and Actuators, B: Chemical*, 205, 276–280.
- Guzmán, M. G., Dille, J., dan Godet, S. (2008). Synthesis of silver nanoparticles by chemical reduction method and their antibacterial activity. *International Journal of Materials and Metallurgical Engineering*. 2(7), 91–98.
- Hall, W. P., Ngatia, S. N., dan Van Duyne, R. P. (2011). LSPR biosensor signal enhancement using nanoparticle-antibody conjugates. *Journal of Physical Chemistry C*, 115(5), 1410–1414.
- Hamouda, R. A., Hussein, M. H., Abo-elmagd, R. A., dan Bawazir, S. S. (2019). Synthesis and biological characterization of silver nanoparticles derived from the cyanobacterium Oscillatoria limnetica. *Scientific Reports*, 9(1), 1–17.
- Haes, A. J., Haynes, C. L., McFarland, A. D., Schatz, G. C., Van Duyne, R. P., dan Zou, S. (2005). Plasmonic materials for surface-enhanced sensing and spectroscopy. *MRS Bulletin*, 30(5), 368–375.
- Hasan, M., Ullah, I., Zulfiqar, H., Naeem, K., Iqbal, A., Gul, H., Ashfaq, M., dan Mahmood, N. (2018). Biological entities as chemical reactors for synthesis of nanomaterials: Progress, challenges and future perspective. *Materials Today Chemistry*, 8, 13–28.
- Heidari, B., Salmani, S., Sasani Ghamsari, M., Ahmadi, M., dan Majles-Ara, M. H. (2020). Ag/PVP nanocomposite thin film with giant optical nonlinearity. *Optical and Quantum Electronics*, 52(2).
- Homola, J. (2006). Surface plasmon resonance based sensors, Springer series on chemical sensors and biosensor/methods and applications. In *Springer Tracts In Modern Physics*, Springer-Verlag Berlin ed., Heidelberg NY (Vol. 4).
- Homola, J., Yee, S. S., dan Gauglitz, G. (1999). Surface plasmon resonance sensors: review. *Sensors and Actuators, B: Chemical*, 54(1), 3–15.



- Hong, Y., Huh, Y. M., Yoon, D. S., dan Yang, J. (2012). Nanobiosensors based on localized surface plasmon resonance for biomarker detection. *Journal of Nanomaterials*, 2012 (January).
- Hou, J., Wang, Y., Xue, H., dan Dou, Y. (2018). Biomimetic growth of hydroxyapatite on electrospun CA/PVP core-shell nanofiber membranes. *Polymers*, 10(9).
- Hu, W. P., Chen, S. J., Huang, K. T., Hsu, J. H., Chen, W. Y., Chang, G. L., dan Lai, K. A. (2004). A novel ultrahigh-resolution surface plasmon resonance biosensor with an Au nanocluster-embedded dielectric film. *Biosensors and Bioelectronics*, 19(11), 1465–1471.
- Ibrahim, H. M., Zaghloul, S., Hashem, M., dan El-Shafei, A. (2021). A green approach to improve the antibacterial properties of cellulose based fabrics using *Moringa oleifera* extract in presence of silver nanoparticles. *Cellulose*, 28(1), 549–564.
- Inkson, B. J. (2016). Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) for materials characterization. In *Materials Characterization Using Nondestructive Evaluation (NDE) Methods*. Elsevier Ltd.
- Islam, A., Mandal, C., dan Habib, A. (2021). Antibacterial potential of synthesized silver nanoparticles from leaf extract of *Moringa oleifera*. *Journal of Advanced Biotechnology and Experimental Therapeutics*, 4(1), 67–73.
- Jalab, J. Wassim, A., Adawia K., dan Al-Kayali. R. (2021). Green-synthesis of silver nanoparticles using aqueous extract of *Acacia cyanophylla* and its antibacterial activity, *Heliyon*, 7(9), p. e08033.
- Jagtap, S., Chopade, P., Tadepalli, S., Bhalerao, A., dan Gosavi, S. (2019). A review on the progress of ZnSe as inorganic scintillator. *Opto-Electronics Review*, 27(1), 90–103.
- Janani, B., Syed, A., Thomas, A. M., Marraiki, N., Al-rashed, S., Elgorban, A. M., Raju, L. L., Das, A., dan Khan, S. S. (2020). Enhanced SPR signals based on methylenediphosphonic acid functionalized AgNPs for the detection of Hg (II) in the presence of an antioxidant glutathione. *Journal of Molecular Liquids*, 311, 113281.
- Jatschka, J., Dathe, A., Csáki, A., Fritzsche, W., dan Stranik, O. (2016). Propagating and localized surface plasmon resonance sensing-A critical comparison based on measurements and theory. *Sensing and Bio-Sensing Research*, 7, 62–70.
- Jia, Y., Peng, Y., Bai, J., Zhang, X., Cui, Y., Ning, B., Cui, J., dan Gao, Z. (2018). Magnetic nanoparticle enhanced surface plasmon resonance sensor for Estradiol analysis. *Sensors and Actuators, B: Chemical*, 254, 629–635.
- Jian, Z., Xiang, Z., dan Yongchang, W. (2005). Electrochemical synthesis and



fluorescence spectrum properties of silver nanospheres. *Microelectronic Engineering*, 77(1), 58–62.

Jiang, X. C., Chen, W. M., Chen, C. Y., Xiong, S. X., dan Yu, A. B. (2011). Role of temperature in the growth of silver nanoparticles through a synergetic reduction approach. *Nanoscale Research Letters*, 6(1), 1–9.

Juharni, J., Maulana, I., Suharyadi, E., Kato, T., dan Iwata, S. (2021). The effect of Ag concentration of core-shell Fe₃O₄@Ag nanoparticles for sensitivity enhancement of surface plasmon resonance (SPR)-based biosensor. *Key Engineering Materials*, 884, 337–341.

Juharni, J., Yahya, I. M., Suharyadi, E., Kato, T., dan Iwata, S. (2021). Microstructures, absorption spectra, and magnetic properties of core-shell Fe₃O₄@Ag nanoparticles for enhancing sensitivity of surface plasmon resonance (SPR) sensor. *International Journal of Nanoelectronics and Materials*, 14(3), 209–217.

Katata-Seru, L., Moremedi, T., Aremu, O. S., dan Bahadur, I. (2018). Green-synthesis of iron nanoparticles using *Moringa oleifera* extracts and their applications: Removal of nitrate from water and antibacterial activity against *Escherichia coli*. *Journal of Molecular Liquids*, 256, 296–304.

Khetani, A., Momenpour, A., Tiwari, V. S., dan Anis, H. (2015). Surface enhanced Raman scattering (SERS) using Nanoparticles. *Engineering Materials*, 47–70.

Khor, K. Z., Joseph, J., Shamsuddin, F., Lim, V., Moses, E. J., dan Samad, N. A. (2020). The cytotoxic effects of *Moringa oleifera* leaf extract and silver nanoparticles on human kasumi-1 cells. *International Journal of Nanomedicine*, 15, 5661–5670.

Kim, Y. H., Lee, D. K., dan Kang, Y. S. (2005). Synthesis and characterization of Ag and Ag-SiO₂ nanoparticles. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 257–258(October 2003), 273–276.

Kočevar, N., Glavač, I., dan Kreft, S. (2007). Flavonoids. *Farmacevtski Vestnik*, 58(4), 145–148.

Koczkur, K. M., Mourikoudis, S., Polavarapu, L., dan Skrabalak, S. E. (2015). Polyvinylpyrrolidone (PVP) in nanoparticle synthesis. *Dalton Transactions*, 44(41), 17883–17905.

Kolya, H., Maiti, P., Pandey, A., dan Tripathy, T. (2015). Green-synthesis of silver nanoparticles with antimicrobial and azo dye (Congo red) degradation properties using *Amaranthus gangeticus* linn leaf extract. *Journal of Analytical Science and Technology*, 6(1), 4–10.

Kosuda, K.M., dan Groarke, R.J. (2016). Localized surface plasmon resonance. In *Comprehensive Nanoscience and Nanotechnology (Second Edition)*.



- Laksono, F. D. (2017). Pengembangan sistem sensor berbasis *surface plasmon resonance* (SPR) yang *real-time* terotomatisasi dan beresolusi tinggi. *Skripsi S1*. Universitas Gadjah Mada, Yogyakarta
- Lal, H. M., Thomas, S., Li, T., dan Maria, H. J. (2021). Polymer nanocomposites based on silver nanoparticles. *Springer Inter. Publishing*.
- Lee, S. H., dan Jun, B. H. (2019). Silver nanoparticles: Synthesis and application for nanomedicine. *International Journal of Molecular Sciences*, 20(4).
- Lee, J. U., Nguyen, A. H., dan Sim, S. J. (2015). A nanoplasmonic biosensor for label-free multiplex detection of cancer biomarkers. *Biosensors and Bioelectronics*, 74, 341–346.
- Li, D. G., Chen, S. H., Zhao, S. Y., Hou, X. M., Ma, H. Y., dan Yang, X. G. (2004). Simple method for preparation of cubic Ag nanoparticles and their self-assembled films. *Thin Solid Films*, 460(1–2), 78–82.
- Liu, J., dan Li, Z. (2022). Control of surface plasmon resonance in silver nanocubes by CEP-locked laser pulse. *Photonics*, 9(2).
- Mahmudin, L., Suharyadi, E., Utomo, A. B. S., dan Abraha, K. (2016). Influence of stabilizing agent and synthesis temperature on the optical properties of silver nanoparticles as active materials in surface plasmon resonance (SPR) biosensor. *AIP Conference Proceedings*, 1725(2016).
- Mahmudin, L., Suharyadi, E., Utomo, A. B. S., dan Abraha, K. (2015). Optical properties of silver nanoparticles for surface plasmon resonance (SPR)-based biosensor applications. *Journal of Modern Physics*, 06(08), 1071–1076.
- Martins, C. S. M., Sousa, H. B. A., dan Prior, J. A. V. (2021). From impure to purified silver nanoparticles: Advances and timeline in separation methods. *Nanomaterials*, 11(12).
- Mateus, G. A. P., Paludo, M. P., Dos Santos, T. R. T., Silva, M. F., Nishi, L., Fagundes-Klen, M. R., Gomes, R. G., dan Bergamasco, R. (2018). Obtaining drinking water using a magnetic coagulant composed of magnetite nanoparticles functionalized with *Moringa oleifera* seed extract. *Journal of Environmental Chemical Engineering*, 6(4), 4084–4092.
- Matinise, N., Fuku, X. G., Kaviyarasu, K., Mayedwa, N., dan Maaza, M. (2017). ZnO nanoparticles via *Moringa oleifera* green-synthesis: Physical properties and mechanism of formation. *Applied Surface Science*, 406, 339–347.
- Mayer, K. M., dan Hafner, J. H. (2011). Localized surface plasmon resonance sensors. *Chemical Reviews*, 111(6), 3828–3857.
- Mazur, M. (2004). Electrochemically prepared silver nanoflakes and nanowires. *Electrochemistry Communications*, 6(4), 400–403.
- McMahon, Gillian. 2007. Analytical instrumentation : A guide to laboratory,



portable and miniaturized instruments. *J. Wiley.*

- Mehta, B. K., Chhajlani, M., dan Shrivastava, B. D. (2017). Green-synthesis of silver nanoparticles and their characterization by XRD. *Journal of Physics: Conference Series*, 836(1).
- Mehwish, H. M., Rajoka, M. S. R., Xiong, Y., Cai, H., Aadil, R. M., Mahmood, Q., He, Z., dan Zhu, Q. (2021). Green-synthesis of a silver nanoparticle using *Moringa oleifera* seed and its applications for antimicrobial and sun-light mediated photocatalytic water detoxification. *Journal of Environmental Chemical Engineering*, 9(4), 105290.
- Midelet, J., El-Sagheer, A. H., Brown, T., Kanaras, A. G., dan Werts, M. H. V. (2017). The sedimentation of colloidal nanoparticles in solution and its study using quantitative digital photography. *Particle and Particle Systems Characterization*, 34(10).
- Mohammadzadeh-Asl, S., Aghanejad, A., de la Guardia, M., Ezzati Nazhad Dolatabadi, J., dan Keshtkar, A. (2021). Surface plasmon resonance signal enhancement based on erlotinib loaded magnetic nanoparticles for evaluation of its interaction with human lung cancer cells. *Optics and Laser Technology*, 133(August 2020), 106521.
- Moodley, J. S., Krishna, S. B. N., Pillay, K., Sershen, dan Govender, P. (2018). Green-synthesis of silver nanoparticles from *Moringa oleifera* leaf extracts and its antimicrobial potential. *Advances in Natural Sciences: Nanoscience and Nanotechnology*, 9(1).
- Mosiori, C. O., Oeba, D. A., dan Shikambe, R. (2017). Determination of Planck's constant using light emitting diodes. *Path of Science*, 3(10), 2007–2012.
- Mukhtar, W. M., Ayob, N. R., Halim, R. M., Samsuri, N. D., Murat, N. F., Rashid, A. R. A., dan Dasuki, K. A. (2018). Effect of noble metal thin film thicknesses on surface plasmon resonance (SPR) signal amplification. *Journal of Advanced Research in Materials Science*, 49(1), 1–9.
- Mukhtar, W. M., Halim, R. M., dan Hassan, H. (2017). Optimization of SPR signals: Monitoring the physical structures and refractive indices of prisms. *EPJ Web of Conferences*, 162.
- Mukhtar, W. M., Susthitha Menon, P., Shaari, S., Malek, M. Z. A., dan Abdullah, A. M. (2013). Angle shifting in surface plasmon resonance: Experimental and theoretical verification. *Journal of Physics: Conference Series*, 431(1).
- Nayagama, V., Palanisamy, K., dan Thiraviadoss, D. (2019). Cyto-toxicity and oligodynamic effect of bio-synthesized silver nanoparticles from plant residue of *Artocarpus altilis* and its spectroscopic analysis. 2(February), 301–313.
- Patel, K., Kapoor, S., Dave, D. P., dan Mukherjee, T. (2006). Synthesis of Au, Au/Ag, Au/Pt and Au/Pd nanoparticles using the microwave-polyol method.



Research on Chemical Intermediates, 32(2), 103–113.

- Patel, S., Chaki, S. H., dan Vinodkumar, P. C. (2019). Pure SnSe, In and Sb doped SnSe single crystals—Growth, structural, surface morphology and optical bandgap study. *Journal of Crystal Growth*, 522, 16–24.
- Pavia, D. L., Lampman, G. M., dan Kriz, G. s. (2009). Introduction to spectroscopy. In measurement and detection of radiation. *Thomson Learning*.
- Peng, T. C., Lin, W. C., Chen, C. W., Tsai, D. P., dan Chiang, H. P. (2011). Enhanced sensitivity of surface plasmon resonance phase-interrogation biosensor by using silver nanoparticles. *Plasmonics*, 6(1), 29–34.
- Pillai, Z. S., dan Kamat, P. V. (2004). What factors control the size and shape of silver nanoparticles in the citrate ion reduction method. *Journal of Physical Chemistry B*, 108(3), 945–951.
- Prabowo, B. A., Purwidyantri, A., dan Liu, K. C. (2018). Surface plasmon resonance optical sensor: A review on light source technology. *Biosensors*, 8(3).
- Prakashan, V. P., Gejo, G., Sanu, M. S., Sajna, M. S., Subin, T., Biju, P. R., Cyriac, J., dan Unnikrishnan, N. V. (2019). Novel SPR based fiber optic sensor for vitamin A using Au@Ag core-shell nanoparticles doped SiO₂-TiO₂-ZrO₂ ternary matrix. *Applied Surface Science*, 484(April), 219–227.
- Prasad, T. N. V. K. V., dan Elumalai, E. K. (2011). Biofabrication of Ag nanoparticles using Moringa oleifera leaf extract and their antimicrobial activity. *Asian Pacific Journal of Tropical Biomedicine*, 1(6), 439–442.
- Rahma, A., Munir, M. M., Khairurrijal, Prasetyo, A., Suendo, V., dan Rachmawati, H. (2016). Intermolecular interactions and the release pattern of electrospun curcumin-polyvinyl(pyrrolidone) fiber. *Biological and Pharmaceutical Bulletin*, 39(2), 163–173.
- Razis, A. F. A., Ibrahim, M. D., dan Kntayya, S. B. (2014). Health benefits of Moringa oleifera. *Asian Pacific Journal of Cancer Prevention*, 15(20), 8571–8576.
- Reddy, N. V., Li, H., Hou, T., Bethu, M. S., Ren, Z., dan Zhang, Z. (2021). Phytosynthesis of silver nanoparticles using Perilla frutescens leaf extract: Characterization and evaluation of antibacterial, antioxidant, and anticancer activities. *International Journal of Nanomedicine*, 16, 15–29.
- Reimer, L., dan Kohl, H. (2008). Transmission electron microscopy. In A. E. W. T. Rhodes (Ed.), *Hepato-Gastroenterology* (5th ed., Vol. 50, Issue 52). Springer.
- Rubio, A. S. (2015). Modified Au-based nanomaterials studied by surface plasmon resonance spectroscopy.



- Saison, E., dan Gharibshahi, E. (2014). On the theory of metal nanoparticles based on quantum mechanical calculation. *Malaysian Journal of Fundamental and Applied Sciences*, 7(1), 6–11.
- Sardana, N., Birr, T., Schlenker, S., Reinhardt, C., dan Schilling, J. (2014). Surface plasmons on ordered and bi-continuous spongy nanoporous gold. *New Journal of Physics*, 16(0001).
- Sathyavathi, R., Bala Murali Krishna, M., dan Narayana Rao, D. (2011). Biosynthesis of silver nanoparticles using *Moringa oleifera* leaf extract and its application to optical limiting. *Journal of Nanoscience and Nanotechnology*, 11(3), 2031–2035.
- Sau, S., dan Kundu, S. (2022). Variation in structure and properties of poly(vinyl alcohol) (PVA) film in the presence of silver nanoparticles grown under heat treatment. *Journal of Molecular Structure*, 1250, 131699.
- Shameli, K., Ahmad, M. Bin, Zamanian, A., Sangpour, P., Shabanzadeh, P., Abdollahi, Y., dan Zargar, M. (2012). Green biosynthesis of silver nanoparticles using *Curcuma longa* tuber powder. *International Journal of Nanomedicine*, 7, 5603–5610.
- Shivashankar, M., dan Sisodia, G. (2012). Biosynthesis of silver nanoparticles obtained from plant extracts of *Moringa oleifera*. *International Journal of Life Sciences Biotechnology and Pharma Research*, 1(3), 182–185.
- Sholikhah, U. N., Pranowo, D., Arvianto, R. I., Sarmini, E., dan Widyaningrum, T. (2020). Purification method of silver nanoparticles (AgNPs) and its identification using UV-Vis spectrophotometer. *Key Engineering Materials*, 840 KEM, 484–491.
- Shrivastav, A. M., Mishra, S. K., dan Gupta, B. D. (2015). Fiber optic SPR sensor for the detection of melamine using molecular imprinting. *Sensors and Actuators, B: Chemical*, 212, 404–410.
- Sibiya, P. N., dan Moloto, M. J. (2014). Effect of precursor concentration and pH on the shape and size of starch capped silver selenide (Ag₂Se) nanoparticles. *Chalcogenide Letters*, 11(11), 577–588.
- Smitha, S. L., Nissamudeen, K. M., Philip, D., dan Gopchandran, K. G. (2008). Studies on surface plasmon resonance and photoluminescence of silver nanoparticles. *Spectrochimica Acta-Part A: Molecular and Biomolecular Spectroscopy*, 71(1), 186–190.
- Song, Y. J., Wang, M., Zhang, X. Y., Wu, J. Y., dan Zhang, T. (2014). Investigation on the role of the molecular weight of polyvinyl pyrrolidone in the shape control of highyield silver nanospheres and nanowires. *Nanoscale Research Letters*, 9(1), 1–8.



- Some, S., Bulut, O., Biswas, K., Kumar, A., Roy, A., Sen, I. K., Mandal, A., Franco, O. L., İnce, İ. A., Neog, K., Das, S., Pradhan, S., Dutta, S., Bhattacharjya, D., Saha, S., Das Mohapatra, P. K., Bhuimali, A., Unni, B. G., Kati, A., Ocsoy, I. (2019). Effect of feed supplementation with biosynthesized silver nanoparticles using leaf extract of *Morus indica* L. V1 on *Bombyx mori* L. (Lepidoptera: Bombycidae). *Scientific Reports*, 9(1).
- Sun, T., Zhang, Y., Zhao, F., Xia, N., dan Liu, L. (2020). Self-assembled biotin phenylalanine nanoparticles for the signal amplification of surface plasmon resonance biosensors. *Microchimica Acta*, 187, 473.
- Stanford, A. L., dan Tanner, J. M. (1985). Early quantum physics. *Physics for Students of Science and Engineering*, 691–716.
- Supardianingsih, Suharyadi, E., dan Abraha K., (2018). Magneto-optical properties of Fe₃O₄ nanoparticles using surface plasmon resonance (SPR)-based biosensor. *The 5th International Conference of Asian Union of Magnetics Societies Jeju Korea*.
- Talabani, R. F., Hamad, S. M., Barzinjy, A. A., dan Demir, U. (2021). Biosynthesis of silver nanoparticles and their applications in harvesting sunlight for solar thermal generation. *Nanomaterials*, 11(9).
- Tamada, K., Nakamura, F., Ito, M., Li, X., dan Baba, A. (2007). SPR-based DNA detection with metal nanoparticles. *Plasmonics*, 2(4), 185–191.
- Tanvi, Mahajan, A., Bedi, R. K., Kumar, S., Saxena, V., dan Aswal, D. K. (2015). Effect of the crystallinity of silver nanoparticles on surface plasmon resonance induced enhancement of effective absorption cross-section of dyes. *Journal of Applied Physics*, 117(8).
- Terenteva, E. A., Apyari, V. V., Dmitrienko, S. G., dan Zolotov, Y. A. (2015). Formation of plasmonic silver nanoparticles by flavonoid reduction: A comparative study and application for determination of these substances. *Spectrochimica Acta-Part A: Molecular and Biomolecular Spectroscopy*, 151, 89–95.
- Theivasanthi, T., dan Alagar, M. (2012). Silver Nanoparticle Synthesize. *Nano Biomedicine and Engineering*, 4(2).
- Tiloke, C., Anand, K., Gengan, R. M., dan Chuturgoon, A. A. (2018). *Moringa oleifera* and their phytonanoparticles: Potential antiproliferative agents against cancer. *Biomedicine and Pharmacotherapy*, 108(September), 457–466.
- Toropov, N. A., Leonov, N. B., dan Vartanyan, T. A. (2018). Influence of silver nanoparticles crystallinity on localized surface plasmons dephasing times. *Physica Status Solidi (B) Basic Research*, 255(3), 1–5.
- Vibhute S. K., K. V. K. P. W. G. (2014). Synthesis of silver nanoparticles from



- Moringa oleifera: Formulation and evaluation against Cadidia albicans. *Indo American Journal of Pharmaceutical Research*, 4(3), 1581–1587.
- Vinita, Tiwari, M., dan Prakash, R. (2018). Colorimetric detection of picric acid using silver nanoparticles modified with 4-amino-3-hydrazino-5-mercaptop-1,2,4-triazole. *Applied Surface Science*, 449(February), 174–180.
- Wan Ahamad, W. M. A., Kamarun, D., Abd Rahman, M. K., dan Kamarudin, M. S. (2015). Modular surface plasmon resonance (SPR) biosensor based on wavelength modulation. *Advanced Materials Research*, 1107, 699–705.
- Wang, X., Wang, X., Liu, Y., Chu, T., Li, Y., Dai, C., Yang, Y., dan Zhang, Y. (2021). Surface plasma enhanced fluorescence combined aptamer sensor based on silica modified silver nanoparticles for signal amplification detection of cholic acid. *Microchemical Journal*, 168(February), 106524.
- Wang, X., Hou, T., Lin, H., Lv, W., Li, H., dan Li, F. (2019). In situ template generation of silver nanoparticles as amplification tags for ultrasensitive surface plasmon resonance biosensing of microRNA. *Biosensors and Bioelectronics*, 137(April), 82–87.
- Wang, N., Zhang, D., Deng, X., Sun, Y., Wang, X., Ma, P., dan Song, D. (2018). A novel surface plasmon resonance biosensor based on the PDA-AgNPs-PDA-Au film sensing platform for horse IgG detection. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 191, 290–295.
- Wang, Q., Li, Q., Yang, X., Wang, K., Du, S., Zhang, H., dan Nie, Y. (2016). Graphene oxide-gold nanoparticles hybrids-based surface plasmon resonance for sensitive detection of microRNA. *Biosensors and Bioelectronics*, 77, 1001–1007.
- Wang, Y., Dostalek, J., dan Knoll, W. (2011). Magnetic nanoparticle-enhanced biosensor based on grating-coupled surface plasmon resonance. *Analytical Chemistry*, 83(16), 6202–6207.
- Wang, H., Qiao, X., Chen, J., Wang, X., dan Ding, S. (2005). Mechanisms of PVP in the preparation of silver nanoparticles. *Materials Chemistry and Physics*, 94(2–3), 449–453.
- Wiley, B., Sun, Y., dan Xia, Y. (2008). ChemInform abstract: Synthesis of silver nanostructures with controlled shapes and properties. *ChemInform*, 39(4), 1067–1076.
- Wu, L., Chu, H. S., Koh, W. S., dan Li, E. P. (2010). Highly sensitive graphene biosensors based on surface plasmon resonance. *Optics Express*, 18(14), 14395.
- Xinglong, Y., Dingxin, W., Xing, W., Xiang, D., Wei, L., dan Xinsheng, Z. (2005). A surface plasmon resonance imaging interferometry for protein micro-array detection. *Sensors and Actuators, B: Chemical*, 108(1-2 SPEC. ISS.), 765–771.



- Xue, J., Zavgorodniy, A. V., Kennedy, B. J., Swain, M. V., dan Li, W. (2013). X-ray microdiffraction, TEM characterization and texture analysis of human dentin and enamel. *Journal of Microscopy*, 251(2), 144–153.
- Yang, Z., Wang, J., Shao, Y., Jin, Y., dan Yi, M. (2020). Studying corrosion of silver thin film by surface plasmon resonance technique. *Optical and Quantum Electronics*, 52(1), 1–8.
- Yih, J.-N., Chen, S.-J., Huang, K.-T., Su, Y.-T., dan Lin, G.-Y. (2004). A compact surface plasmon resonance and surface-enhanced Raman scattering sensing device. *Plasmonics in Biology and Medicine*, 5327, 5.
- Yuan, H., Ji, W., Chu, S., Liu, Q., Guang, J., Sun, G., Zhang, Y., Han, X., Masson, J. F., dan Peng, W. (2020). Au nanoparticles as label-free competitive reporters for sensitivity enhanced fiber-optic SPR heparin sensor. *Biosensors and Bioelectronics*, 154(January), 112039.
- Zafar, S., dan Zafar, A. (2019). Biosynthesis and characterization of silver nanoparticles using phoenix Dactylifera fruits extract and their in vitro antimicrobial and cytotoxic effects. *The Open Biotechnology Journal*, 13(1), 37–46.
- Zeng, S., Baillargeat, D., Ho, H. P., dan Yong, K. T. (2014). Nanomaterials enhanced surface plasmon resonance for biological and chemical sensing applications. *Chemical Society Reviews*, 43(10), 3426–3452.
- Zhang, G., Yu, M. Bin, Tung, C. H., dan Lo, G. Q. (2008). Quantum size effects on dielectric constants and optical absorption of ultrathin silicon films. *IEEE Electron Device Letters*, 29(12), 1302–1305.
- Zhang, J. P., Chen, P., Sun, C. H., dan Hu, X. J. (2004). Sonochemical synthesis of colloidal silver catalysts for reduction of complexing silver in DTR system. *Applied Catalysis A: General*, 266(1), 49–54.
- Zhang, Z., Zhao, B., dan Hu, L. (1996). PVP protective mechanism of ultrafine silver powder synthesized by chemical reduction processes. *Journal of Solid State Chemistry*, 121(1), 105–110.
- Zhu, Z., Li, H., Xiang, Y., Koh, K., Hu, X., dan Chen, H. (2020). Pyridinium porphyrins and Au NPs mediated bionetworks as SPR signal amplification tags for the ultrasensitive assay of brain natriuretic peptide. *Microchimica Acta*, 187, 327.