

DAFTAR PUSTAKA

- Abifarini, J. K., Obada, D. O., Dauda, E. T., & Dodoo-Arhin, D. (2019). Experimental data on the characterization of hydroxyapatite synthesized from biowastes. *Data in Brief*, 26, 104485. <https://doi.org/10.1016/j.dib.2019.104485>
- Abriyani, E., Syalomita, D., Apriani, I. P., Puspawati, I., & Adiputra, S. (2024). Pengaruh Pengolahan Termal Terhadap Struktur Molekul Material Polimer Studi Dengan Spektroskopi FTIR. *Innovative: Journal Of Social Science Research*, 4(1), 3424–3432.
- Agustina, H. P. (2023). *Fabrikasi dan Karakterisasi Gel HA-Halictis Asinina Berbasis Biopolimer- Kurma Ajwa sebagai Agen Antibakteri Untuk Remineralisasi Gigi*. UNIVERSITAS GADJAH MADA.
- Alaee, A., Azizi, A., Valaei, N., Taheri, S., Ravanshadi, F., Hajipour, M., & Fattahi, M. (2019). In-Vitro Effect of Natural Honey on the Growth of Streptococcus sanguinis. *Journal of Research in Dental and Maxillofacial Sciences*, 4(1), 1–8. <https://doi.org/10.29252/jrdms.4.1.1>
- Amalina, R., Monica, D., Feranisa, A., Syafaat, F. Y., Sari, M., & Yusuf, Y. (2021). Development Of Hydroxyapatite Asian Moon Scallop (Amusium Pleuronectes) Gel And Its Effect After Application on Tooth Enamel White-Spot Lesion. *Cakradonya Dental Journal*, 13(2), 81–87. <http://www.jurnal.unsyiah.ac.id/CDJ>
- Anil, A., Ibraheem, W. I., Meshni, A. A., Preethanath, R. S., & Anil, S. (2022). Nano-Hydroxyapatite (nHAp) in the Remineralization of Early Dental Caries: A Scoping Review. *International Journal of Environmental Research and Public Health*, 19(9). <https://doi.org/10.3390/ijerph19095629>
- Asawahame, C., Sutjarittangtham, K., Eitssayeam, S., Tragoolpua, Y., Sirithunyalug, B., & Sirithunyalug, J. (2015). Formation of orally fast dissolving fibers containing propolis by electrospinning technique. *Chiang Mai Journal of Science*, 42(2), 469–480. <https://doi.org/https://cmudc.library.cmu.ac.th/frontend/Info/item/dc:88233>
- Asmi, D., & Zulfia, A. (2017). *Blood Cockle Shells Waste as Renewable Source for the Production of Biogenic CaCO₃ and Its Characterisation Blood Cockle Shells Waste as Renewable Source for the Production of Biogenic CaCO₃ and Its Characterisation*. <https://doi.org/10.1088/1755-1315/94/1/012049>
- Balhuc, S., Campian, R., Labunet, A., Negucioiu, M., Buduru, S., & Kui, A. (2021). Dental applications of systems based on hydroxyapatite nanoparticles—an evidence-based update. *Crystals*, 11(6), 1–19. <https://doi.org/10.3390/cryst11060674>
- Balouiri, M., Sadiki, M., & Ibnsouda, S. K. (2016). Methods for in vitro evaluating antimicrobial activity: A review. *Journal of Pharmaceutical Analysis*, 6(2), 71–79. <https://doi.org/10.1016/j.jpha.2015.11.005>
- Bernd, J. (2023). *Bioceramics Development and Applications In Vitro Testing: Advancing Science and Ethical Considerations*. 13(2014), 5025. <https://doi.org/10.37421/2090-5025.2023.13.243>
- Bhavan Ram, U., Sujatha, V., Vidhya, S., Jayasree, R., & Mahalaxmi, S. (2023). Oyster shell-derived nano-hydroxyapatite and proanthocyanidin pretreatment on dentinal tubule occlusion and permeability before and after acid challenge—an in vitro study. *Journal of Materials Science: Materials in*

- Medicine*, 34(4). <https://doi.org/10.1007/s10856-023-06724-4>
- Bruno, T. J. (1999). Sampling accessories for infrared spectrometry. *Applied Spectroscopy Reviews*, 34(1–2), 91–120. <https://doi.org/10.1081/ASR-100100840>
- Bunaciu, A. A., Udriștioiu, E. gabriela, & Aboul-Enein, H. Y. (2015). X-Ray Diffraction: Instrumentation and Applications. *Critical Reviews in Analytical Chemistry*, 45(4), 289–299. <https://doi.org/10.1080/10408347.2014.949616>
- Charlena, C., Suparto, I. H., & Laia, D. P. O. (2023). *JURNAL*. 13(1), 85–96.
- Chen, L., Al-Bayate, S., Khurshid, Z., Shavandi, A., Brunton, P., & Ratnayake, J. (2021). Hydroxyapatite in oral care products—a review. *Materials*, 14(17). <https://doi.org/10.3390/ma14174865>
- Dampang, S., Purwanti, E., Destyorini, F., Kurniawan, S. B., Abdullah, S. R. S., & Imron, M. F. (2021). Analysis of Optimum Temperature and Calcination Time in the Production of CaO Using Seashells Waste as CaCO₃ Source. *Journal of Ecological Engineering*, 22(5), 221–228. <https://doi.org/10.12911/22998993/135316>
- Davis, W. W., & Stout, T. R. (1971). *Disc Plate Method of Microbiological Antibiotic Assay*. 22(4), 659–665.
- Desai, A. Y. (2007). *Fabrication and Characterization of Titanium-doped Hydroxyapatite Thin Films*. August. <https://doi.org/https://doi.org/10.17863/CAM.14178>
- Dinatha, I. K. H., Diputra, A. H., Wihadmadyatami, H., Partini, J., & Yusuf, Y. (2024). Nanofibrous electrospun scaffold doped with hydroxyapatite derived from sand lobster shell (*Panulirus homarus*) for bone tissue engineering. *RSC Advances*, 14(12), 8222–8239. <https://doi.org/10.1039/d4ra00619d>
- Eisenhuth, G., Patil, S., & Freitas, C. M. T. (2025). *Nano-hydroxyapatite for Dental Caries Prevention and Enamel Remineralization: A Review of Current Evidence*. June, 8–13.
- Esposti, L. D., Ionescu, A. C., Brambilla, E., Tampieri, A., & Iafisco, M. (2020). Characterization of a toothpaste containing bioactive hydroxyapatites and in vitro evaluation of its efficacy to remineralize enamel and to occlude dentinal tubules. *Materials*, 13(13), 1–13. <https://doi.org/10.3390/ma13132928>
- Fan, M., Dai, D., & Huang, B. (2012). Fourier Transform Infrared Spectroscopy for Natural Fibres. *Fourier Transform - Materials Analysis*, May 2012. <https://doi.org/10.5772/35482>
- Febrian, K., Triaminingsih, S., & Indrani, D. J. (2017). In-vitro study investigating influence of toothpaste containing green tea extract on the microhardness of demineralized human enamel. *Journal of Physics: Conference Series*, 884(1). <https://doi.org/10.1088/1742-6596/884/1/012010>
- Febrianasari, F. (2018). Uji Aktivitas Antibakteri Ekstrak Daun Kirinyu (*Chromolaena odorata*) Terhadap *Staphylococcus aureus*. In *Sanata Dharma University*.
- Fiana, F. M., Kiromah, N. Z. W., & Purwanti, E. (2020). Aktivitas Antibakteri Ekstrak Etanol Daun Sukun (*Artocarpus altilis*) Terhadap Bakteri *Staphylococcus aureus* Dan *Escherichia coli*. *Pharmakon: Jurnal Farmasi Indonesia*, 10–20. <https://doi.org/10.23917/pharmakon.v0i0.10108>
- Firnanelly, F., Abubakar, A. N. F., Qurniawan, A., & Syam, M. A. (2023). Comparison of Air Contact And Distilled Water Distribution Method in The

- Conversion of Cao to Ca(OH)₂ As A Precursor Hydroxyapatite Synthesis. *JKPK (Jurnal Kimia Dan Pendidikan Kimia)*, 8(3), 423. <https://doi.org/10.20961/jkpk.v8i3.78348>
- Fu, Z., Zhuang, Y., Cui, J., Sheng, R., Tomás, H., Rodrigues, J., Zhao, B., Wang, X., & Lin, K. (2022). Development and challenges of cells- and materials-based tooth regeneration. *Engineered Regeneration*, 3(2), 163–181. <https://doi.org/10.1016/j.engreg.2022.04.003>
- Ginting, E. D. D., Susetya, I. E., Patana, P., & Desrita. (2021). Identifikasi jenis-jenis bivalvia di Perairan Tanjungbalai, Provinsi Sumatera Utara Identification. *Acta Aquatica*, 8(8), 98–102.
- Goldstein, J. I., Newbury, D. E., Echlin, P., Joy, D. C., Lyman, C. E., Lifshin, E., Sawyer, L., & Michael, J. R. (2003). Scanning Electron Microscopy and X-ray Microanalysis. In *Kluwer Academic/Plenum Publishers*. Springer US. <https://doi.org/10.1007/978-1-4615-0215-9>
- Guzmán-rodríguez, J. J., López-gómez, R., Suárez-rodríguez, L. M., Salgado-garciglia, R., Rodríguez-zapata, L. C., Ochoa-zarzosa, A., & López-meza, J. E. (2013). *Antibacterial Activity of Defensin PaDef from Avocado Fruit (Persea americana var . drymifolia) Expressed in Endothelial Cells against Escherichia coli and Staphylococcus aureus*. 2013.
- Hermanto, L. O., Nibenia, J., Sharon, K., & Rosa, D. (2023). Review artikel: Pemanfaatan tanaman sirih (Piper betle L) sebagai obat tradisional. *Pharmaceutical Science Journal*, 3(1), 33–42.
- Herryawan, Khaerunnisa, R., & Nuraini Fajri, F. (2021). EFFECTIVENESS TEST OF ANTIBACTERIAL EXTRACT MINT LEAF (Mentha piperita L.) INHIBIT GROWTH IN Streptococcus sanguinis. *Journal of Health and Dental Sciences*, 1(Volume 1 No 1), 49–59. <https://doi.org/10.54052/jhds.v1n1.p49-59>
- Hidayanti, F., & Harnovan, A. A. (2020). Application of Scanning Electron Microscopy: a Review. *International Journal of Applied Science and Engineering Review*, 1(6), 91–102.
- Hossain, S. M., & Ahmed, S. (2023). FTIR spectrum analysis to predict the crystalline and amorphous phases of hydroxyapatite: a comparison of vibrational motion to reflection. *RSC Advances*, 13(21), 14625–14630. <https://doi.org/10.1039/d3ra02580b>
- Indrani, D. J. (2015). Hardness of Demineralized Enamel with the Application of Toothpaste Containing Green Tea Extract. *Makara Journal of Health Research*, 19(1). <https://doi.org/10.7454/msk.v19i1.4599>
- Jamilludin, M. A., Dinatha, I. K. H., Supii, A. I., Partini, J., Kusindarta, D. L., & Yusuf, Y. (2023). Chemical and Morphological Analysis of Calcium Oxide (CaO) Powder from Sea Urchin (*Diadema setosum*) Shell. *Engineering Chemistry*, 3, 37–43. <https://doi.org/10.4028/p-497n8w>
- Juntavee, A., Juntavee, N., & Sinagpulo, A. N. (2021). Nano-Hydroxyapatite Gel and Its Effects on Remineralization of Artificial Carious Lesions. *International Journal of Dentistry*, 2021, 1–12. <https://doi.org/10.1155/2021/7256056>
- Kabakoran, F. J., Niwele, A., & Yuyun, M.; (2022). Uji AKTIVITAS ANTIBAKTERI EKSTRAK ETANOL DAUN TURI (Sesbania grandiflora L) TERHADAP PERTUMBUHAN Stapylococcus aureus DENGAN

- METODE CAKRAM. *Jurnal Ilmiah Kedokteran Dan Kesehatan*, 1(2), 126–141. <https://doi.org/10.55606/klinik.v1i2.1162>
- Kareem, R. O., Bulut, N., & Kaygili, O. (2024). Hydroxyapatite Biomaterials: A Comprehensive Review of their Properties, Structures, Medical Applications, and Fabrication Methods. *Journal of Chemical Reviews*, 6(1), 1–26. <https://doi.org/10.48309/jcr.2024.415051.1253>
- Kelana, I. (2020). Rokhmin: Limbah Perikanan, dari Sampah Menjadi Berkah. *Republika.Co.Id*. <https://republika.co.id/berita/qfbbdw374/rokhmin-limbah-perikanan-dari-sampah-menjadi-berkah>. Di akses tanggal 25 Oktober 2025
- Kemenkes, K. K. R. I. (2025). *KEPUTUSAN MENTERI KESEHATAN REPUBLIK INDONESIA*.
- Koruyucu, M., Tuna İnce, E. B., Zandona, A. F., & Modesto Vieira, A. (2022). Editorial: Remineralization Procedures in Pediatric Dentistry. *Frontiers in Dental Medicine*, 3(June), 1–2. <https://doi.org/10.3389/fdmed.2022.949367>
- Kursia, S., Lebang, J. S., Taebe, B., Burhan, A., R Rahim, W. O., Tinggi Ilmu Farmasi Makassar, S., Selatan, S., & Farmasi Kebangsaan Makassar, A. (2016). Uji Aktivitas Antibakteri Ekstrak Etilasetat Daun Sirih Hijau (Piper betle L.) terhadap Bakteri Staphylococcus epidermidis. *Indonesian Journal of Pharmaceutical Science and Technology*, 3(2), 72–77. <http://jurnal.unpad.ac.id/ijpst/article/view/8643>
- Lara-Ochoa, S., Ortega-Lara, W., & Guerrero-Beltrán, C. E. (2021). Hydroxyapatite nanoparticles in drug delivery: Physicochemistry and applications. *Pharmaceutics*, 13(10), 1–24. <https://doi.org/10.3390/pharmaceutics13101642>
- Lawarti, R. A., & Cahyaningrum, S. E. (2022). Potential Antibacterial Activity of Hydroxyapatite Composite And Green Betel Leaf Extract (Piper betle L.) Against Streptococcus mutans Bacteria. *Indonesian Journal of Chemical Science*, 11(1), 41–49. <https://doi.org/10.15294/ijcs.v11i1.51059>
- Lee, I.-H., Lee, J.-A., Lee, J.-H., Heo, Y.-W., & Kim, J.-J. (2020). Effects of pH and reaction temperature on hydroxyapatite powders synthesized by precipitation. *Journal of the Korean Ceramic Society*, 57(1), 56–64. <https://doi.org/10.1007/s43207-019-00004-0>
- Liao, J., Qiu, J., Lin, Y., & Li, Z. (2024). The application of hydrogels for enamel remineralization. *Heliyon*, 10(13), e33574. <https://doi.org/10.1016/j.heliyon.2024.e33574>
- Lim, J., Lawless, H. T., & Science, F. (2005). *Qualitative Differences of Divalent Salts: Multidimensional Scaling and Cluster Analysis*. 2003, 719–726. <https://doi.org/10.1093/chemse/bji064>
- Lopresti, F., Carfi Pavia, F., Vitrano, I., Kersaudy-Kerhoas, M., Brucato, V., & La Carrubba, V. (2020). Effect of hydroxyapatite concentration and size on morpho-mechanical properties of PLA-based randomly oriented and aligned electrospun nanofibrous mats. *Journal of the Mechanical Behavior of Biomedical Materials*, 101(September 2019). <https://doi.org/10.1016/j.jmbbm.2019.103449>
- Magvirah, T., Marwati, & Ardhani, F. (2019). *UJI DAYA HAMBAT BAKTERI Staphylococcus aureus MENGGUNAKAN EKSTRAK DAUN TAHONGAI (Kleinhovia hospita L.) Bacterial*. 2(September), 41–50.
- Marchini, C., Triunfo, C., Greggio, N., Fermani, S., Montroni, D., Migliori, A.,

- Gradone, A., Goffredo, S., Maoloni, G., Gómez Morales, J., Cölfen, H., & Falini, G. (2024). Nanocrystalline and Amorphous Calcium Carbonate from Waste Seashells by Ball Milling Mechanochemistry Processes. *Crystal Growth and Design*, 24(2), 657–668. <https://doi.org/10.1021/acs.cgd.3c01007>
- Masta, N. (2020). Buku Materi Pembelajaran Scanning Electron Microscopy. *Patra Widya: Seri Penerbitan Penelitian Sejarah Dan Budaya.*, 21(3), i–iii.
- Meyer, F., Enax, J., Amaechi, B. T., Limeback, H., Fabritius, H. O., Ganss, B., Pawinska, M., & Paszynska, E. (2022). Hydroxyapatite as Remineralization Agent for Children’s Dental Care. *Frontiers in Dental Medicine*, 3(April), 1–10. <https://doi.org/10.3389/fdmed.2022.859560>
- Montaser, M. M., Youssef, H., & Mahmoud, G. M. (2025). *Comparison of the remineralization effectiveness of three remineralizing agents on arti fi cial enamel lesions : an in vitro study.* December 2024, 1–12. <https://doi.org/10.1038/s41405-025-00330-y>
- Mozartha, M. (2015). Hidroksiapatit Dan Aplikasinya Di Bidang Kedokteran Gigi. *Cakradonya Dent J*, 7(2)(2), 807–868.
- Muhaimin, F. I., Cahyaningrum, S. E., Lawarti, R. A., & Maharani, D. K. (2023). Characterization and Antibacterial Activity Assessment of Hydroxyapatite-Betel Leaf Extract Formulation against Streptococcus mutans In Vitro and In Vivo. *Indonesian Journal of Chemistry*, 23(2), 358–369. <https://doi.org/10.22146/ijc.77853>
- Müller, K. H., Motskin, M., Philpott, A. J., Routh, A. F., Shanahan, C. M., Duer, M. J., & Skepper, J. N. (2014). The effect of particle agglomeration on the formation of a surface-connected compartment induced by hydroxyapatite nanoparticles inhuman monocyte-derived macrophages. *Biomaterials*, 35(3), 1074–1088. <https://doi.org/10.1016/j.biomaterials.2013.10.041>
- Muttaqin, R. (2023). Pengembangan Buku Panduan Teknik Karakterisasi Material : X-ray Diffractometer (XRD) Panalytical Xpert3 Powder. *Indonesian Journal of Laboratory*, 1(1), 9. <https://doi.org/10.22146/ijl.v1i1.78970>
- Naim, J., & Sen, S. (2025). *The Remineralizing and Desensitizing Potential of Hydroxyapatite in Dentistry : A Narrative Review of Recent Clinical Evidence.*
- Nisa, A., Sari, M., & Yusuf, Y. (2022). Fabrication and characterization of HA-oyster shell based on biopolymer - propolis as an agent of dental enamel remineralization materialti. *Materials Research Express*, 9(11), 115401. <https://doi.org/10.1088/2053-1591/aca31c>
- Nugroho, J. J., & Hafsari, W. R. (2017). *The effectiveness of betel leaf (piper betle Linn) extract gel and cocoa bean (theobroma cacao L) extract gel application against the hardness of enamel surface in vitro .* 2(1), 23–27. <https://doi.org/10.15562/jdmfs.v2i1.450>
- Nurhayati, Muhdarina, Linggawati, A., Anita, S., & Amri, T. A. (2016). Preparation and Characterization of Calcium Oxide Heterogeneous Catalyst Derived from Anadara Granosa Shell for Biodiesel Synthesis. *KnE Engineering*, 1(1), 0–8. <https://doi.org/10.18502/keg.v0i0.494>
- Owu, N. M., Fatimawali, ., & Jayanti, M. (2020). Uji Efektivitas Penghambatan Dari Ekstrak Daun Sirih (Piper Betle L.) Terhadap Bakteri Streptococcus mutans. *Jurnal Biomedik:JBM*, 12(3), 145. <https://doi.org/10.35790/jbm.12.3.2020.29185>
- Panda, R. N., Hsieh, M. F., Chung, R. J., & Chin, T. S. (2003). FTIR, XRD, SEM

- and solid state NMR investigations of carbonate-containing hydroxyapatite nano-particles synthesized by hydroxide-gel technique. *Journal of Physics and Chemistry of Solids*, 64(2), 193–199. [https://doi.org/10.1016/S0022-3697\(02\)00257-3](https://doi.org/10.1016/S0022-3697(02)00257-3)
- Pokhrel, S. (2018). Hydroxyapatite: Preparation, Properties and Its Biomedical Applications. *Advances in Chemical Engineering and Science*, 08(04), 225–240. <https://doi.org/10.4236/aces.2018.84016>
- Putu, I. D., Nyoman, N., Ayu, I. G., Sri, N., Lilik, P., & Kristiyanti, P. (2023). Optimasi Kinerja Alat Fourier Transform Infrared (FTIR) Melalui Studi Perbandingan Komposisi dan Ketebalan Sampel-KBr. 5(2), 58–69.
- Rahmaniah, R. (2019). SINTESIS DAN KARAKTERISASI HIDROKSIAPATIT DARI CANGKANG KERANG DARAH (Anadara granosa) SEBAGAI BAHAN BAKU SEMEN TAMBAL GIGI. *Teknosains: Media Informasi Sains Dan Teknologi*, 13(1), 27–32. <https://doi.org/10.24252/teknosains.v13i1.7832>
- Ramadhanti, D. M., Nurhapsari, A., & Rochmah, Y. S. (2025). Physicochemical Characteristics of Asian Moon Scallop Shell as a Tooth Remineralization Agent. *Tropical Journal of Natural Product Research*, 9(January), 183–188. <https://doi.org/https://doi.org/10.26538/tjnpr/v9i1.26>
- Respati, S. M. B. (2010). Bahan Biomaterial Stainless Steel Dan Keramik. *Momentum*, 6(1), 5–8. <https://publikasiilmiah.unwahas.ac.id/index.php/MOMENTUM/article/view/132/125>
- Rizkayanti, Y. (2017). Sintesis Dan Karakterisasi Hidroksiapatit (HAp) Berbahan Dasar Biogenik dengan Variasi Suhu Sintesis. In *Universitas Gadjah Mada*. Universitas Gadjah Mada.
- Rizkayanti, Y., & Yusuf, Y. (2018). Effect of temperature on syntesis of hydroxyapatite from cockle shells (Anadara Granosa). *International Journal of Nanoelectronics and Materials*, 11(April), 43–50. <https://doi.org/10.13140/RG.2.2.26013.67047>
- Rositsa Denkova, Bogdan Georgiev Goranov, Desislava Teneva, Zapryana Denkova, & Georgi Kostov. (2017). Antimicrobial activity of probiotic microorganisms: Mechanisms of interaction and methods of examination. *Antimicrobial Research: Novel Bioknowledge and Educational Programs*, 1(201–12).
- Rowe, R. C., Sheskey, P. J., & Owen, S. C. (2006). *Handbook of pharmaceutical excipients.*–5th ed. /.
- Sadih, H. H., Cahyadi, A. I., & Windria, S. (2022). Kajian Potensi Daun Sirih Hijau (Piper betle L) sebagai Antibakteri. *Jurnal Sain Veteriner*, 40(2), 128–138.
- Sahdiah, H., & Kurniawan, R. (2023). Optimasi Tegangan Akselerasi pada Scanning Electron Microscope – Energy Dispersive X-Ray Spectroscopy (SEM-EDX) untuk Pengamatan Morfologi Sampel Biologi. *Jurnal Sains Dan Edukasi Sains*, 6(2), 117–123. <https://doi.org/10.24246/juses.v6i2p117-123>
- Santoso, J. H., Prahasti, A. E., & Elline, E. (2024). EFFECT OF 4 wt% HYDROXYAPATITE PASTA ON DENTAL EMAIL HARDNESS. 20(1), 46–52. <https://doi.org/10.46862/interdental.v20i1.8580>
- Santoso, P. (2022). Studi Penangkapan Kerang Darah (Anadara granosa) Menuju

- Pengembangan Budidayanya di Kecamatan Kupang Tengah, Kabupaten Kupang. *Jurnal Vokasi Ilmu-Ilmu Perikanan (Jvip)*, 2(2), 24. <https://doi.org/10.35726/jvip.v2i2.601>
- Sari, M., Ramadhanti, D. M., Amalina, R., Chotimah, Ana, I. D., & Yusuf, Y. (2022). Development of a hydroxyapatite nanoparticle-based gel for enamel remineralization —A physicochemical properties and cell viability assay analysis. *Dental Materials Journal*, 41(1), 68–77. <https://doi.org/10.4012/dmj.2021-102>
- Sari, M., Supardi, Kuswanto, H., Prasetyowati, R., Nugroho, K. A., Dwandaru, W. S. B., & Yusuf, Y. (2025). *Tropical Journal of Natural Product Research against Lactobacillus acidophilus, Streptococcus sanguinis, and Streptococcus mutans*. 9(September), 4607–4611.
- Sari, M., & Yusuf, Y. (2018). Synthesis and characterization of hydroxyapatite based on green mussel shells (perna viridis) with the variation of stirring time using the precipitation method. *IOP Conference Series: Materials Science and Engineering*, 432(1). <https://doi.org/10.1088/1757-899X/432/1/012046>
- Sinurat, E., Dewi, F. R., Fransiska, D., & Nurbayasari, R. (2022). Synthesis and Characterization of Hydroxyapatite of Cockle Shells (Anadara granosa) Originated from Indonesia Through Precipitation Method. *IOP Conference Series: Earth and Environmental Science*, 1118(1), 0–11. <https://doi.org/10.1088/1755-1315/1118/1/012035>
- Stathopoulou, E. T., Psycharis, V., Chryssikos, G. D., Gionis, V., & Theodorou, G. (2008). Bone diagenesis: New data from infrared spectroscopy and X-ray diffraction. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 266(3–4), 168–174. <https://doi.org/10.1016/j.palaeo.2008.03.022>
- Sukirawati, S., & Sri Resky. (2024). PEMANFAATAN LIMBAH CANGKANG KERANG DARAH (Anadaragranosa) KOMBINASI EKSTRAK ETANOL DAUN SIRIH (Piper betle L.) DALAM BENTUK SEDIAAN PASTA GIGI. *Jurnal Kesehatan Yamas Makassar*, 8(1), 87–93. <https://doi.org/10.59060/jurkes.v8i1.326>
- Sukmana, I., Eka Risano, A. Y., Arif Wicaksono, M., & Adi Saputra, R. (2022). Perkembangan dan Aplikasi Biomaterial dalam Bidang Kedokteran Modern: A Review. *INSOLOGI: Jurnal Sains Dan Teknologi*, 1(5), 635–646. <https://doi.org/10.55123/insologi.v1i5.1037>
- Sulistiyani, M., & Huda, N. (2018). *Indonesian Journal of Chemical Science Perbandingan Metode Transmisi dan Reflektansi pada Pengukuran Polistirena Menggunakan Instrumentasi Spektroskopi Fourier Transform Infrared*. 7(2).
- Suprihadi, S., Thaib, A., Nurhayati, N., & Handayani, L. (2023). The potential of fishery waste as an alternative source of natural calcium: a review. *Acta Aquatica: Aquatic Sciences Journal*, 10(2), 163. <https://doi.org/10.29103/aa.v10i2.9755>
- Sutiyono, S., Edahwati, L., Wahyudi, M. R. A., & Rahmah, N. A. (2024). *Optimization of Nano-Hydroxyapatite Production from Limestone with Effect of Gelatin Concentration and pH in Sol-Gel Synthesis*. 05(2), 42–49.
- Sutowo, C., Ikhsan, M., & Kartika, I. (2014). Karakteristik Material Biokompatibel Aplikasi Implan Medis Jenis Bone Plate. *Seminar Nasional Sains Dan Teknologi 2014, November*, 1–5.

- Tathe, A., Ghodke, M., & Nikalje, A. P. (2010). A brief review: Biomaterials and their application. *International Journal of Pharmacy and Pharmaceutical Sciences*, 2(SUPPL. 4), 19–23.
- Todros, S., Todesco, M., & Bagno, A. (2021). Biomaterials and their biomedical applications: From replacement to regeneration. *Processes*, 9(11). <https://doi.org/10.3390/pr9111949>
- Tordoff, M. G., Valmeki, S., Jiang, P., & Alarco, L. K. (2012). *T1R3: A human calcium taste receptor*. 14, 3–6. <https://doi.org/10.1038/srep00496>
- Wahyuni, S., Bikarindasari, R., & Fauzia, M. N. (2022). The Effect Of Isotonic Solution Immersion On Tooth Enamel Hardness After Topical Application Of CPP-ACPF And fTCP. *Jurnal Kesehatan Gigi*, 9(1), 42–46. <https://doi.org/http://ejournal.poltekkes-smg.ac.id/ojs/index.php/jkg/index>
- Wiselyana, I. T., Noerdin, A., Irawan, B., & Soufyan, A. (2018). Effect of betel leaf extract gel on the hardness of enamel. *The 2nd Physics and Technologies in Medicine and Dentistry Symposium IOP Conf. Series: Journal of Physics: Conf. Series 1073 (2018) 032023*. <https://doi.org/10.1088/1742-6596/1073/3/032023>
- Yadav, K., & Prakash, S. (2016). *Dental Caries: A Review*. August. <https://doi.org/10.15272/ajbps.v6i53.773>
- Ylinen, P. (2006). Applications of Coralline Hydroxyapatite With Bioabsorbable Containment and Reinforcement As Bone Graft Substitute. In *Helsingin Yliopisto* (Issue November).
- Yucesoy, D. T., Fong, H., Hamann, J., Hall, E., Dogan, S., & Sarikaya, M. (2023). Biomimetic Dentin Repair: Amelogenin-Derived Peptide Guides Occlusion and Peritubular Mineralization of Human Teeth. *ACS Biomaterials Science and Engineering*, 9(3), 1486–1495. <https://doi.org/10.1021/acsbiomaterials.2c01039>
- Yusuf, Y., Khasanah, D. U., Syafaat, F. Y., Pawarangan, I., Sari, M., Mawuntu, V. J., & Rizkayanti, Y. (2019). Hidroksiapatit Berbahan Dasar Biogenik. In *Gadjah Mada University Press*.
- Zaman, S. U., Irfan, M., Irfan, M., Muhammad, N., Zaman, M. K. U., Rahim, A., & Rehman, S.-U. (2020). Overview of hydroxyapatite; composition, structure, synthesis methods and its biomedical uses. *Biomedical Letters ISSN 2410-955X– An International Biannually Journal*, 6(Nanotechnology in Nanomedicine), 84–99.
- Zhai, T., Lin, Y., Chen, Y., & Lian, Z. (2024). Preparation and Morphology Control of Hydroxyapatite by Aqueous Precipitation. *Scientific Journal of Technology*, 6(1), 37–41. <https://doi.org/10.54691/p46chn44>