Synergistic Improvement of Thermal Conductivity, Tensile Performance and Hardness of DLP 3D Printed
Composite using Boron Nitride and Aluminum Oxide Fillers
Zeeshan Hamid Malik , Ir. Muhammad Akhsin Muflikhun, S.T., MSME., Ph.D; Ir. Achmad Pratama Rifai, S.T., M.Eng.
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

REFERENCES

Aktas, B., Das, R., Acikgoz, A., Demircan, G., Yalcin, S., Aktas, H.G. and Balak, M.V. (2024), "DLP 3D printing of TiO2-doped Al2O3 bioceramics: Manufacturing, mechanical properties, and biological evaluation", *Materials Today Communications*, Elsevier BV, Vol. 38, p. 107872, doi: 10.1016/j.mtcomm.2023.107872.

Ambrosi, A. and Pumera, M. (2016), "3D-printing technologies for electrochemical applications", *Chemical Society Reviews*, Royal Society of Chemistry, 21 May, doi: 10.1039/c5cs00714c.

Arif, Z.U., Khalid, M.Y., Noroozi, R., Hossain, M., Shi, H.T.H., Tariq, A., Ramakrishna, S., *et al.* (2023), "Additive manufacturing of sustainable biomaterials for biomedical applications", *Asian Journal of Pharmaceutical Sciences*, Shenyang Pharmaceutical University, 1 May, doi: 10.1016/j.ajps.2023.100812.

Bledzki, A.K., Seidlitz, H., Goracy, K., Urbaniak, M. and Rösch, J.J. (2021), "Recycling of carbon fiber reinforced composite polymers—review—part 1: Volume of production, recycling technologies, legislative aspects", *Polymers*, MDPI AG, 2 January, doi: 10.3390/polym13020300.

Bogaerts, L., Faes, M., Bergen, J., Cloots, J., Vasiliauskaite, E., Vogeler, F. and Moens, D. (2020), "Influence of thermo-mechanical loads on the lifetime of plastic inserts for injection moulds produced via additive manufacturing", *Procedia CIRP*, Vol. 96, Elsevier B.V., pp. 109–114, doi: 10.1016/j.procir.2021.01.061.

Callister Jr, W.D., and Rethwisch, D.G. (2018), *Materials Science and Engineering- An Introduction 10th Edition.*, Hachette Livre - Département Pratique.

Cerdas, F., Juraschek, M., Thiede, S. and Herrmann, C. (2017), "Life Cycle Assessment of 3D Printed Products in a Distributed Manufacturing System", *Journal of Industrial Ecology*, Blackwell Publishing, Vol. 21, pp. S80–S93, doi: 10.1111/jiec.12618.

Chen, C.H., Jian, J.Y. and Yen, F.S. (2009), "Preparation and characterization of epoxy/γ-aluminum oxide nanocomposites", *Composites Part A: Applied Science and Manufacturing*, Vol. 40 No. 4, pp. 463–468, doi: 10.1016/j.compositesa.2009.01.010.

Coppola, B., Cappetti, N., Di Maio, L., Scarfato, P. and Incarnato, L. (2017), *Layered Silicate Reinforced Polylactic Acid Filaments for 3D Printing of Polymer Nanocomposites*, doi: 10.1109/RTSI.2017.8065892.

Cosmi, F. and Dal Maso, A. (2019), "A mechanical characterization of SLA 3D-printed specimens for low-budget applications", *Materials Today: Proceedings*, Vol. 32, Elsevier Ltd, pp. 194–201, doi: 10.1016/j.matpr.2020.04.602.

DebRoy, T., Wei, H.L., Zuback, J.S., Mukherjee, T., Elmer, J.W., Milewski, J.O., Beese, A.M., *et al.* (2018), "Additive manufacturing of metallic components – Process, structure and properties", *Progress in Materials Science*, Elsevier Ltd, 1 March, doi: 10.1016/j.pmatsci.2017.10.001.

Favero, C.S., English, J.D., Cozad, B.E., Wirthlin, J.O., Short, M.M. and Kasper, F.K. (2017), "Effect of print layer height and printer type on the accuracy of 3-dimensional printed orthodontic models", *American Journal of Orthodontics and Dentofacial Orthopedics*, Mosby Inc., Vol. 152 No. 4, pp. 557–565, doi: 10.1016/j.ajodo.2017.06.012.

Franco, D., Ganga, G., Santa-Eulalia, L.A. and Filho, M. (2020), "Consolidated and inconclusive effects of Additive Manufacturing adoption: a systematic literature review", *Computers & Industrial Engineering*, Vol. 148, p. 106713, doi: 10.1016/j.cie.2020.106713.

Gackowski, B.M., Phua, H., Sharma, M. and Idapalapati, S. (2022), "Hybrid additive manufacturing of polymer composites reinforced with buckypapers and short carbon fibres", *Composites Part A: Applied Science and Manufacturing*, Elsevier Ltd, Vol. 154, doi: 10.1016/j.compositesa.2021.106794.

Gebler, M., Schoot Uiterkamp, A.J.M. and Visser, C. (2014), "A global sustainability perspective on 3D printing technologies", *Energy Policy*, Vol. 74 No. C, pp. 158–167.

Gibson, I., Rosen, D. and Stucker, B. (2010), *Additive Manufacturing Technologies – Rapid Prototyping to Direct Digital Manufacturing*, *Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing*, Vol. 5, doi: 10.1007/978-1-4419-1120-9.

Gibson, I., Rosen, D. and Stucker, B. (2015), *Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, Second Edition*, *Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, Second Edition*, Springer New York, doi: 10.1007/978-1-4939-2113-3.

Gibson, I., Rosen, D., Stucker, B. and Khorasani, M. (2020), *Additive Manufacturing Technologies*, *Additive Manufacturing Technologies*, Springer International Publishing, doi: 10.1007/978-3-030-56127-7.

Goh, G.D., Yap, Y.L., Agarwala, S. and Yeong, W.Y. (2019), "Recent Progress in Additive Manufacturing of Fiber Reinforced Polymer Composite", *Advanced Materials Technologies*, Wiley-Blackwell, 1 January, doi: 10.1002/admt.201800271.

Grootel, A., Chang, J., Wardle, B. and Olivetti, E. (2020), "Manufacturing variability drives significant environmental and economic impact: The case of carbon fiber reinforced polymer composites in the aerospace industry", *Journal of Cleaner Production*, Vol. 261, p. 121087, doi: 10.1016/j.jclepro.2020.121087.

Hanif, Z., Khoe, D.D., Choi, K.I., Jung, J.H., Pornea, A.G.M., Yanar, N., Kwak, C., *et al.* (2024a), "Synergistic effect on dispersion, thermal conductivity and mechanical performance of pyrene modified boron nitride nanotubes with Al2O3/epoxy composites", *Composites Science and Technology*, Elsevier Ltd, Vol. 247, doi: 10.1016/j.compscitech.2023.110419.

Hanif, Z., Khoe, D.D., Choi, K.-I., Jung, J.-H., Pornea, A.G.M., Yanar, N., Kwak, C., *et al.* (2024b), "Synergistic effect on dispersion, thermal conductivity and mechanical performance of pyrene modified boron nitride nanotubes with Al2O3/epoxy composites", *Composites Science and Technology*, Elsevier BV, Vol. 247, p. 110419, doi: 10.1016/j.compscitech.2023.110419.

He, R., Liu, W., Wu, Z., An, D., Huang, M., Wu, H., Jiang, Q., *et al.* (2018), "Fabrication of complex-shaped zirconia ceramic parts via a DLP-stereolithography-based 3D printing method", *Ceramics International*, Elsevier Ltd, Vol. 44 No. 3, pp. 3412–3416, doi: 10.1016/j.ceramint.2017.11.135.

He, X., Huang, Y., Liu, Y., Zheng, X., Kormakov, S., Sun, J., Zhuang, J., *et al.* (2018), "Improved thermal conductivity of polydimethylsiloxane/short carbon fiber composites prepared by spatial confining forced network assembly", *Journal of Materials Science*, Springer New York LLC, Vol. 53 No. 20, pp. 14299–14310, doi: 10.1007/s10853-018-2618-4.

Hohimer, C., Aliheidari, N., Mo, C. and Ameli, A. (2017), "Mechanical behavior of 3D printed multiwalled carbon nanotube/thermoplastic polyurethane nanocomposites", *ASME 2017 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS 2017*, Vol. 1, American Society of Mechanical Engineers, doi: 10.1115/SMASIS2017-3808.

Hu, G., Cao, Z., Hopkins, M., Lyons, J.G., Brennan-Fournet, M. and Devine, D.M. (2019), "Nanofillers can be used to enhance the thermal conductivity of commercially available SLA resins", *Procedia Manufacturing*, Vol. 38, Elsevier B.V., pp. 1236–1243, doi: 10.1016/j.promfg.2020.01.215.

Javaid, M. and Haleem, A. (2019), "Current status and challenges of Additive manufacturing in orthopaedics: An overview", *Journal of Clinical Orthopaedics and Trauma*, Elsevier B.V., Vol. 10 No. 2, pp. 380–386, doi: 10.1016/j.jcot.2018.05.008.

Jiang, F., Cui, S., Rungnim, C., Song, N., Shi, L. and Ding, P. (2019), "Control of a Dual-Cross-Linked Boron Nitride Framework and the Optimized Design of the Thermal Conductive Network for Its Thermoresponsive Polymeric Composites", *Chemistry of Materials*, American Chemical Society, Vol. 31 No. 18, pp. 7686–7695, doi: 10.1021/acs.chemmater.9b02551.

Jungst, T., Smolan, W., Schacht, K., Scheibel, T. and Groll, J. (2016), "Strategies and Molecular Design Criteria for 3D Printable Hydrogels", *Chemical Reviews*, American Chemical Society, 10 February, doi: 10.1021/acs.chemrev.5b00303.

Kalsoom, U., Nesterenko, P.N. and Paull, B. (2016), "Recent developments in 3D printable composite materials", *RSC Advances*, Royal Society of Chemistry, doi: 10.1039/c6ra11334f.

Kumar, S., Singh, R., Singh, T.P. and Batish, A. (2022), "On mechanical characterization of 3-D printed PLA-PVC-wood dust-Fe3O4 composite", *Journal of Thermoplastic Composite Materials*, SAGE Publications Ltd, Vol. 35 No. 1, pp. 36–53, doi: 10.1177/0892705719879195.

Kunovjanek, M. and Reiner, G. (2020), "How will the diffusion of additive manufacturing impact the raw material supply chain process?", *International Journal of Production Research*, Taylor and Francis Ltd., Vol. 58 No. 5, pp. 1540–1554, doi: 10.1080/00207543.2019.1661537.

Lakkala, P., Munnangi, S.R., Bandari, S. and Repka, M. (2023), "Additive manufacturing technologies with emphasis on stereolithography 3D printing in pharmaceutical and medical applications: A review", *International Journal of Pharmaceutics: X*, Elsevier B.V., Vol. 5, doi: 10.1016/j.ijpx.2023.100159.

Lang, M., Hirner, S., Wiesbrock, F. and Fuchs, P. (2022), "A Review on Modeling Cure Kinetics and Mechanisms of Photopolymerization", *Polymers*, MDPI, Vol. 14 No. 10, doi: 10.3390/polym14102074.

Lee, K.G., Park, K.J., Seok, S., Shin, S., Kim, D.H., Park, J.Y., Heo, Y.S., *et al.* (2014), "3D printed modules for integrated microfluidic devices", *RSC Advances*, Royal Society of Chemistry, Vol. 4 No. 62, pp. 32876–32880, doi: 10.1039/c4ra05072j.

Li, T., Chen, H., Zhang, Y., Gu, Y., Hu, C., Li, S., Liu, B., *et al.* (2023), "A comprehensive evaluation of vat-photopolymerization resins and alumina slurries for ceramic stereolithography", *Ceramics International*, Elsevier Ltd, Vol. 49 No. 4, pp. 6440–6450, doi: 10.1016/j.ceramint.2022.10.242.

Li, X., Liu, Z., Niu, S., Wang, D., Shi, Z. and Xu, X. (2023), "Controlled anisotropy in 3D printing of silica-based ceramic cores through oxidization reaction of aluminum powders", *Ceramics International*, Elsevier Ltd, Vol. 49 No. 15, pp. 24861–24867, doi: 10.1016/j.ceramint.2023.05.013.

MacDonald, E., Salas, R., Espalin, D., Perez, M., Aguilera, E., Muse, D. and Wicker, R.B. (2014), "3D printing for the rapid prototyping of structural electronics", *IEEE Access*, Institute of Electrical and Electronics Engineers Inc., Vol. 2, pp. 234–242, doi: 10.1109/ACCESS.2014.2311810.

MALIK, Z.H., RIFAI, A.P. and MUFLIKHUN, M.A. (2024), "Comparative study of process parameters' influence on geometric accuracy and relative errors of lightweight compound gear printed by vat. photopolymerization and material extrusion", *Journal of Engineering Research*, doi: 10.1016/j.jer.2024.03.018.

Mathenulla Shariff, M., Arpitha, G.R., Jain, N., Shankar, U., Verma, A. and Shivakumar, N.D. (2023), "A comparative study on the effect of reinforcing boron nitride/alumina in epoxy-based hybrid composite with Millettia pinnata leaf powder and glass sheets: Experimental fabrication, mechanical and micro-structural characterization", *Hybrid Advances*, Elsevier BV, Vol. 4, p. 100095, doi: 10.1016/j.hybadv.2023.100095.

UNIVERSITAS GADJAH MADA
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Moreno Nieto, D., Moreno Sánchez, D. and Mandolini, M. (2021), "Design for Additive Manufacturing: Tool Review and a Case Study", doi: 10.3390/app.

Mostafaei, A., Elliott, A.M., Barnes, J.E., Li, F., Tan, W., Cramer, C.L., Nandwana, P., *et al.* (2021), "Binder jet 3D printing—Process parameters, materials, properties, modeling, and challenges", *Progress in Materials Science*, Elsevier Ltd, 1 June, doi: 10.1016/j.pmatsci.2020.100707.

Muth, J.T., Dixon, P.G., Woish, L., Gibson, L.J. and Lewis, J.A. (2017), "Architected cellular ceramics with tailored stiffness via direct foam writing", *Proceedings of the National Academy of Sciences*, Proceedings of the National Academy of Sciences, Vol. 114 No. 8, pp. 1832–1837, doi: 10.1073/pnas.1616769114.

Nazir, A., Yu, H., Wang, L., Haroon, M., Ullah, R.S., Fahad, S., Naveed, K. ur R., *et al.* (2018), "Recent progress in the modification of carbon materials and their application in composites for electromagnetic interference shielding", *Journal of Materials Science*, Springer New York LLC, Vol. 53 No. 12, pp. 8699–8719, doi: 10.1007/s10853-018-2122-x.

Nguyen, D.T., Meyers, C., Yee, T.D., Dudukovic, N., Destino, J., Zhu, C., Duoss, E., *et al.* (2017), "3D Printed Transparent Glass Advanced Materials", doi: 10.1002/((adma.201701181).

Pathak, A.K., Borah, M., Gupta, A., Yokozeki, T. and Dhakate, S.R. (2016), "Improved mechanical properties of carbon fiber/graphene oxide-epoxy hybrid composites", *Composites Science and Technology*, Elsevier Ltd, Vol. 135, pp. 28–38, doi: 10.1016/j.compscitech.2016.09.007.

Paul, D.R. and Robeson, L.M. (2008), "Polymer nanotechnology: Nanocomposites", *Polymer*, Elsevier BV, 7 July, doi: 10.1016/j.polymer.2008.04.017.

Pazhamannil, R. V., Rajeev, A., Govindan, P. and Edacherian, A. (2022), "Experimental Investigations into the Effects of Process Parameters and UV

UNIVERSITAS
GADJAH MADA
**Synergistic Improvement of Thermal Conductivity, Tensile Performance and Hardness of DLP 3D Printed
Composite using Boron Nitride and Aluminum Oxide Fillers**
Zeeshan Hamid Malik , Ir. Muhammad Akhsin Muflikhun, S.T., MSME., Ph.D; Ir. Achmad Pratama Rifai, S.T., M.Eng.
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Curing on the Tensile Strength of Projection Based Stereolithography", *Strength of Materials*, Springer, Vol. 54 No. 3, pp. 483–492, doi: 10.1007/s11223-022-00423-1.

Petousis, M., Vidakis, N., Mountakis, N., Karapidakis, E. and Moutsopoulou, A. (2023), "Functionality Versus Sustainability for PLA in MEX 3D Printing: The Impact of Generic Process Control Factors on Flexural Response and Energy Efficiency", *Polymers*, MDPI, Vol. 15 No. 5, doi: 10.3390/polym15051232.

Pierre, A., Weger, D., Perrot, A. and Lowke, D. (2018), "Penetration of cement pastes into sand packings during 3D printing: analytical and experimental study", *Materials and Structures*, Vol. 51, p. 22, doi: 10.1617/s11527-018-1148-5.

Pornea, A.G.M., Choi, K.I., Jung, J.H., Hanif, Z., Kwak, C. and Kim, J. (2023), "Enhancement of Isotropic Heat Dissipation of Polymer Composites by Using Ternary Filler Systems Consisting of Boron Nitride Nanotubes, h-BN, and Al2O3", *ACS Omega*, American Chemical Society, Vol. 8 No. 27, pp. 24454–24466, doi: 10.1021/acsomega.3c02246.

Qian, C., Hu, K., Shen, Z., Wang, Q., Li, P. and Lu, Z. (2023), "Effect of sintering aids on mechanical properties and microstructure of alumina ceramic via stereolithography", *Ceramics International*, Elsevier Ltd, Vol. 49 No. 11, pp. 17506–17523, doi: 10.1016/j.ceramint.2023.02.118.

Quan, Z., Wu, A., Keefe, M., Qin, X., Yu, J., Suhr, J., Byun, J.H., *et al.* (2015), "Additive manufacturing of multi-directional preforms for composites: Opportunities and challenges", *Materials Today*, Elsevier B.V., 1 November, doi: 10.1016/j.mattod.2015.05.001.

Quintero, F., Penide, J., Riveiro, A., del Val, J., Comesaña, R., Lusquiños, F. and Pou, J. (2023), "Continuous fiberizing by laser melting (Cofiblas): Production of highly flexible glass nanofibers with effectively unlimited length", *Science*

Advances, American Association for the Advancement of Science, Vol. 6 No. 6, p. eaax7210, doi: 10.1126/sciadv.aax7210.

Al Rashid, A., Ahmed, W., Khalid, M.Y. and Koç, M. (2021), "Vat photopolymerization of polymers and polymer composites: Processes and applications", *Additive Manufacturing*, Elsevier B.V., 1 November, doi: 10.1016/j.addma.2021.102279.

Rayna, T. and Striukova, L. (2016), "From rapid prototyping to home fabrication: How 3D printing is changing business model innovation", *Technological Forecasting and Social Change*, Vol. 102, pp. 214–224.

Rubayo, D.D., Phasuk, K., Vickery, J.M., Morton, D. and Lin, W.-S. (2021), "Influences of build angle on the accuracy, printing time, and material consumption of additively manufactured surgical templates", *The Journal of Prosthetic Dentistry*, Vol. 126 No. 5, pp. 658–663, doi: https://doi.org/10.1016/j.prosdent.2020.09.012.

Saeed, K., McIlhagger, A., Harkin-Jones, E., McGarrigle, C., Dixon, D., Ali Shar, M., McMillan, A., *et al.* (2022), "Characterization of continuous carbon fibre reinforced 3D printed polymer composites with varying fibre volume fractions", *Composite Structures*, Elsevier Ltd, Vol. 282, doi: 10.1016/j.compstruct.2021.115033.

Shah, M., Ullah, A., Azher, K., Ur Rehman, A., Akturk, N., Juan, W., Tüfekci, C.S., *et al.* (2023), "The Influence of Nanoparticle Dispersions on Mechanical and Thermal Properties of Polymer Nanocomposites Using SLA 3D Printing", *Crystals*, MDPI, Vol. 13 No. 2, doi: 10.3390/cryst13020285.

Shuai, X., Zeng, Y., Li, P. and Chen, J. (2020), "Fabrication of fine and complex lattice structure Al2O3 ceramic by digital light processing 3D printing technology", *Journal of Materials Science*, Springer, Vol. 55 No. 16, pp. 6771–6782, doi: 10.1007/s10853-020-04503-y.

Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Song, X., Chen, Y., Lee, T.W., Wu, S. and Cheng, L. (2015), "Ceramic fabrication using Mask-Image-Projection-based Stereolithography integrated with tape-casting", *Journal of Manufacturing Processes*, Elsevier Ltd, Vol. 20, pp. 456–464, doi: 10.1016/j.jmapro.2015.06.022.

Sugiyama, K., Matsuzaki, R., Ueda, M., Todoroki, A. and Hirano, Y. (2018), "3D printing of composite sandwich structures using continuous carbon fiber and fiber tension", *Composites Part A: Applied Science and Manufacturing*, Elsevier Ltd, Vol. 113, pp. 114–121, doi: 10.1016/j.compositesa.2018.07.029.

Tapper, R.J., Longana, M.L., Norton, A., Potter, K.D. and Hamerton, I. (2020), "An evaluation of life cycle assessment and its application to the closed-loop recycling of carbon fibre reinforced polymers", *Composites Part B: Engineering*, Elsevier Ltd, 1 March, doi: 10.1016/j.compositesb.2019.107665.

Tehfe, M.A., Louradour, F., Lalevée, J. and Fouassier, J.P. (2013), "Photopolymerization reactions: On the way to a green and sustainable chemistry", *Applied Sciences (Switzerland)*, MDPI AG, Vol. 3 No. 2, pp. 490–514, doi: 10.3390/app3020490.

Tian, X., Wu, N., Zhang, B., Wang, Y., Geng, Z. and Li, Y. (2021), "Glycine functionalized boron nitride nanosheets with improved dispersibility and enhanced interaction with matrix for thermal composites", *Chemical Engineering Journal*, Elsevier B.V., Vol. 408, doi: 10.1016/j.cej.2020.127360.

Tsolakis, I.A., Papaioannou, W., Papadopoulou, E., Dalampira, M. and Tsolakis, A.I. (2022), "Comparison in Terms of Accuracy between DLP and LCD Printing Technology for Dental Model Printing", *Dentistry Journal*, MDPI, Vol. 10 No. 10, doi: 10.3390/dj10100181.

Varghese, G., Moral, M., Castro-García, M., López-López, J.J., Marín-Rueda, J.R., Yagüe-Alcaraz, V., Hernández-Afonso, L., *et al.* (2018), "Fabricación y caracterización de cerámicas medinate impresión 3D DLP de bajo coste", *Boletin de La Sociedad Espanola de Ceramica y Vidrio*, Sociedad Espanola de Ceramica y Vidrio, Vol. 57 No. 1, pp. 9–18, doi: 10.1016/j.bsecv.2017.09.004.

Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Vidakis, N., Petousis, M., Papadakis, V.M. and Mountakis, N. (2022), "Multifunctional Medical Grade Resin with Enhanced Mechanical and Antibacterial Properties: The Effect of Copper Nano-Inclusions in Vat Polymerization (VPP) Additive Manufacturing", *Journal of Functional Biomaterials*, MDPI, Vol. 13 No. 4, doi: 10.3390/jfb13040258.

Vidakis, N., Petousis, M., Velidakis, E., Mountakis, N., Tsikritzis, D., Gkagkanatsiou, A. and Kanellopoulou, S. (2022), "Investigation of the Biocidal Performance of Multi-Functional Resin/Copper Nanocomposites with Superior Mechanical Response in SLA 3D Printing", *Biomimetics*, MDPI, Vol. 7 No. 1, doi: 10.3390/biomimetics7010008.

Wang, L., Han, D., Luo, J., Li, T., Lin, Z. and Yao, Y. (2018), "Highly Efficient Growth of Boron Nitride Nanotubes and the Thermal Conductivity of Their Polymer Composites", *Journal of Physical Chemistry C*, American Chemical Society, Vol. 122 No. 3, pp. 1867–1873, doi: 10.1021/acs.jpcc.7b10761.

Wang, Q., Sun, J., Yao, Q., Ji, C., Liu, J. and Zhu, Q. (2018), "3D printing with cellulose materials", *Cellulose*, Springer Netherlands, 1 August, doi: 10.1007/s10570-018-1888-y.

Wang, X., Jiang, M., Zhou, Z., Gou, J. and Hui, D. (2017), "3D printing of polymer matrix composites: A review and prospective", *Composites Part B: Engineering*, Elsevier Ltd, 1 February, doi: 10.1016/j.compositesb.2016.11.034.

Wang, Y., Zhou, Y., Lin, L., Corker, J. and Fan, M. (2020), "Overview of 3D additive manufacturing (AM) and corresponding AM composites", *Composites Part A: Applied Science and Manufacturing*, Elsevier Ltd, 1 December, doi: 10.1016/j.compositesa.2020.106114.

Wong, K. V. and Hernandez, A. (2012), "A Review of Additive Manufacturing", *ISRN Mechanical Engineering*, Hindawi Limited, Vol. 2012, pp. 1–10, doi: 10.5402/2012/208760.

Xu, X., Zhou, S., Wu, J., Liu, Y., Wang, Y. and Chen, Z. (2021), "Relationship between the adhesion properties of UV-curable alumina suspensions and the functionalities and structures of UV-curable acrylate monomers for DLP-based ceramic stereolithography", *Ceramics International*, Elsevier Ltd, Vol. 47 No. 23, pp. 32699–32709, doi: 10.1016/j.ceramint.2021.08.166.

Yeh, C.C. and Chen, Y.F. (2018), "Critical success factors for adoption of 3D printing", *Technological Forecasting and Social Change*, Elsevier Inc., Vol. 132, pp. 209–216, doi: 10.1016/j.techfore.2018.02.003.

Yu, H., Guo, P., Qin, M., Han, G., Chen, L., Feng, Y. and Feng, W. (2022), "Highly thermally conductive polymer composite enhanced by two-level adjustable boron nitride network with leaf venation structure", *Composites Science and Technology*, Elsevier Ltd, 3 May, doi: 10.1016/j.compscitech.2022.109406.

Yu, Y., Liu, F., Zhang, R. and Liu, J. (2017), "Suspension 3D Printing: Suspension 3D Printing of Liquid Metal into Self-Healing Hydrogel (Adv. Mater. Technol. 11/2017)", *Advanced Materials Technologies*, Vol. 2, doi: 10.1002/admt.201770050.

Zailan, F.D., Chen, R.S., Ahmad, S.H., Flaifel, M.H., Shahdan, D., Wan Busu, W.N. and Yu, L.J. (2024), "Synergistic improvement of mechanical, electrical and thermal properties by graphene nanoplatelets in polyaniline incorporated rubbery thermoplastic composites", *Journal of Materials Research and Technology*, Elsevier Editora Ltda, Vol. 28, pp. 4097–4109, doi: 10.1016/j.jmrt.2024.01.018.

Zhang, F., Ye, W., Zhou, W., Gao, X., Fang, H. and Ding, Y. (2022a), "Endowing Thermally Conductive and Electrically Insulating Epoxy Composites with a Well-Structured Nanofiller Network via Dynamic Transesterification-Participated Interfacial Welding", *Industrial and Engineering Chemistry Research*, American Chemical Society, Vol. 61 No. 9, pp. 3320–3328, doi: 10.1021/acs.iecr.1c04781.

UNIVERSITAS
GADJAH MADA
**Synergistic Improvement of Thermal Conductivity, Tensile Performance and Hardness of DLP 3D Printed
Composite using Boron Nitride and Aluminum Oxide Fillers**
Zeeshan Hamid Malik , Ir. Muhammad Akhsin Muflikhun, S.T., MSME., Ph.D; Ir. Achmad Pratama Rifai, S.T., M.Eng.
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Zhang, F., Ye, W., Zhou, W., Gao, X., Fang, H. and Ding, Y. (2022b), "Endowing Thermally Conductive and Electrically Insulating Epoxy Composites with a Well-Structured Nanofiller Network via Dynamic Transesterification-Participated Interfacial Welding", *Industrial and Engineering Chemistry Research*, American Chemical Society, Vol. 61 No. 9, pp. 3320–3328, doi: 10.1021/acs.iecr.1c04781.

Zhang, L., Huang, J., He, Y., Liu, K., Xiang, B., Zhai, J., Kong, L.B., *et al.* (2022), "Fabrication and properties of alumina ceramics shaped by digital light processing as an additive manufacturing technology", *International Journal of Applied Ceramic Technology*, Vol. 19 No. 1, pp. 281–288, doi: https://doi.org/10.1111/ijac.13895.

Zhang, X.D., Zhang, Z.T., Wang, H.Z. and Cao, B.Y. (2022), "Thermal Interface Materials with High Thermal Conductivity and Low Young's Modulus Using a Solid-Liquid Metal Codoping Strategy", *ACS Applied Materials and Interfaces*, American Chemical Society, doi: 10.1021/acsami.2c20713.

Zhang, Z. chen, Li, P. lun, Chu, F. ting and Shen, G. (2019), "Influence of the three-dimensional printing technique and printing layer thickness on model accuracy", *Journal of Orofacial Orthopedics*, Urban und Vogel GmbH, Vol. 80 No. 4, pp. 194–204, doi: 10.1007/s00056-019-00180-y.

Zheng, T., Wang, W., Sun, J., Liu, J. and Bai, J. (2020), "Development and evaluation of Al2O3–ZrO2 composite processed by digital light 3D printing", *Ceramics International*, Elsevier Ltd, Vol. 46 No. 7, pp. 8682–8688, doi: 10.1016/j.ceramint.2019.12.102.

Zhou, M., Liu, W., Wu, H., Song, X., Chen, Y., Cheng, L., He, F., *et al.* (2016), "Preparation of a defect-free alumina cutting tool via additive manufacturing based on stereolithography – Optimization of the drying and debinding processes", *Ceramics International*, Elsevier Ltd, Vol. 42 No. 10, pp. 11598–11602, doi: 10.1016/j.ceramint.2016.04.050.

UNIVERSITAS
GADJAH MADA
Synergistic Improvement of Thermal Conductivity, Tensile Performance and Hardness of DLP 3D Printed
Composite using Boron Nitride and Aluminum Oxide Fillers
Zeeshan Hamid Malik , Ir. Muhammad Akhsin Muflikhun, S.T., MSME., Ph.D; Ir. Achmad Pratama Rifai, S.T., M.Eng.
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Zhuo, P., Li, S., Ashcroft, I. and Jones, A. (2021), "Material extrusion additive manufacturing of continuous fibre reinforced polymer matrix composites: A review and outlook", *Composites Part B: Engineering*, Vol. 224, p. 109143, doi: 10.1016/j.compositesb.2021.109143.