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Influence of agro - based reinforcements on the properties of aluminum matrix composites : a systematic review

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Abstract

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Abstract

Aluminum matrix composites (AMCs) have been extensively studied primarily due to higher strength-to-weight ratio, lower cost, and higher wear resistance properties . However, increasing demand for economical and energy-efficient materials in the automotive, aerospace and other applications is tailoring research area in the agro - based composite materials. Therefore, the aim of this systematic review work is to study the influence of agro - based reinforcements on the tribological and mechanical properties of AMC's processed by various techniques. It was observed that the processing conditions can be designed to obtain uniform structures and better properties AMCs. The agro -waste reinforcement materials, such as rice husk ash, bamboo stem ash, coconut and shell ash can result in a reduction in the density of AMC's without compromising mechanical properties . Moreover, the efficient utilization of the agro -waste leads to a decrease in manufacturing cost and prevents environmental pollution, hence, can be considered as a sustainable material. The state-of-the-art revealed that the agro - based reinforcements do not form brittle composites , as in the case of ceramic reinforced composites . Hence, the study concludes that the agro - based AMCs have great potential to act as a replacement for costly and environmentally hazardous ceramic reinforced-AMCs which can especially be used in various automotive applications that demand higher strength-to-weight ratio, lower cost, and higher wear resistance. Graphical abstract: [Figure not available: see fulltext.] © 2021, The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature.

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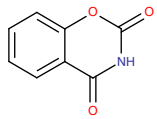

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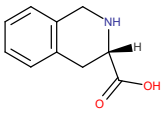

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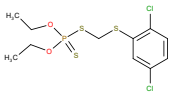

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Engineering controlled terms

Aluminum ; Automobile materials; Density (specific gravity); Energy efficiency; Manufacture; Wear of materials; Wear resistance

Engineering uncontrolled terms

Aluminum matrix composites ; Aluminum matrix composites (AMCs); Automotive applications; Environmental pollutions; Reinforced composites ; Reinforcement materials; Strength to weight ratio; Sustainable materials

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References (196)

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All

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1 Macke, A., Schultz, B.F., Rohatgi, P.

Metal matrix: Composites offer the automotive industry an opportunity to reduce vehicle weight, improve performance

(2012) *Advanced Materials and Processes*, 170 (3), pp. 19-23. Cited 131 times.

2 Miracle, D.B.

Metal matrix composites - From science to technological significance

(2005) *Composites Science and Technology*, 65 (15-16 SPEC. ISS.), pp. 2526-2540. Cited 1268 times.
doi: 10.1016/j.compscitech.2005.05.027

View at Publisher

3 Tung, S.C., McMillan, M.L.
Automotive tribology overview of current advances and challenges for the future

(2004) *Tribology International*, 37 (7), pp. 517-536. Cited 463 times.
www.elsevier.com/inca/publications/store/3/0/4/7/4
doi: 10.1016/j.triboint.2004.01.013

View at Publisher

4 Sun, C., Song, M., Wang, Z., He, Y.
Effect of particle size on the microstructures and mechanical properties of SiC-reinforced pure aluminum composites

(2011) *Journal of Materials Engineering and Performance*, 20 (9), pp. 1606-1612. Cited 83 times.
doi: 10.1007/s11665-010-9801-3

View at Publisher

5 Surappa, M.K.
Aluminium matrix composites: Challenges and opportunities (Open Access)

(2003) *Sadhana - Academy Proceedings in Engineering Sciences*, 28 (1-2), pp. 319-334. Cited 757 times.
http://www.springer.com.ezlib.iium.edu.my/engineering/journal/12046
doi: 10.1007/BF02717141

View at Publisher

6 Rohatgi, B.P.P.K., Schultz, B., Matters, M.
Lightweight metal matrix nanocomposites - stretching the boundaries of metals
(2011) *Mater Matters*, 2 (4), pp. 1-6. Cited 49 times.

7 Surappa, M.K., Rohatgi, P.K.
Preparation and properties of cast aluminium-ceramic particle composites

(1981) *Journal of Materials Science*, 16 (4), pp. 983-993. Cited 264 times.
doi: 10.1007/BF00542743

View at Publisher

8 Maleque, M.A., Atiqah, A., Talib, R.J., Zahurin, H.
New natural fibre reinforced aluminium composite for automotive brake pad

(2012) *International Journal of Mechanical and Materials Engineering*, 7 (2), pp. 166-170. Cited 50 times.

9 Rajan, T.P.D., Pillai, R.M., Pai, B.C.
Reinforcement coatings and interfaces in aluminium metal matrix composites

(1998) *Journal of Materials Science*, 33 (14), pp. 3491-3503. Cited 320 times.
doi: 10.1023/A:1004674822751

View at Publisher

10 Panigrahi, S.K., Jayaganthan, R.
Effect of annealing on precipitation, microstructural stability, and mechanical properties of cryorolled Al 6063 alloy

(2010) *Journal of Materials Science*, 45 (20), pp. 5624-5636. Cited 45 times.
doi: 10.1007/s10853-010-4627-9

View at Publisher

11 Reddy, B.S.B., Das, K., Das, S.
A review on the synthesis of in situ aluminum based composites by thermal, mechanical and mechanical-thermal activation of chemical reactions

(2007) *Journal of Materials Science*, 42 (22), pp. 9366-9378. Cited 115 times.
doi: 10.1007/s10853-007-1827-z

View at Publisher

12 Bahrami, A., Soltani, N., Pech-Canul, M.I., Gutiérrez, C.A.
Development of metal-matrix composites from industrial/agricultural waste materials and their derivatives

(2016) *Critical Reviews in Environmental Science and Technology*, 46 (2), pp. 143-207. Cited 98 times.
www.tandf.co.uk/journals/titles/10643389.asp
doi: 10.1080/10643389.2015.1077067

View at Publisher

13 Lancaster, L., Lung, M.H., Sujan, D., Ash, A.C.S.
Utilization of agro-industrial waste in metal matrix composites: towards sustainability
(2013) *World Acad Sci Eng Technol*, 73, pp. 1136-1144. Cited 57 times.

14 Das, S., Dan, T.K., Prasad, S.V., Rohatgi, P.K.
Aluminium alloy-rice husk ash particle composites

(1986) *Journal of Materials Science Letters*, 5 (5), pp. 562-564. Cited 43 times.
doi: 10.1007/BF01728691

View at Publisher

15 Siddharth, D., Rao, J.B.
Synthesis and characterization of RHA (rice husk ash) particulates reinforced A7075 composites
(2017) *Int J Adv Mech Civ Eng*, 4, pp. 105-110. Cited 3 times.

16 Dwivedi, S.P., Saxena, A., Kumaraswamy, A., Sahu, R.
Synthesis and characterisation of waste SAC-and RHA-reinforced aluminium-based composite
(2021) *Green Mater*

17 Alaneme, K.K., Eze, H.I., Bodunrin, M.O.
Corrosion behaviour of groundnut shell ash and silicon carbide hybrid reinforced Al-Mg-Si alloy matrix composites in 3.5% NaCl and 0.3M H_2SO_4 solutions

(2015) *Leonardo Electronic Journal of Practices and Technologies*, 14 (26), pp. 141-158. Cited 7 times.
http://lejpt.academicdirect.org/A26/141_158.pdf

18 Alaneme, K.K., Bodunrin, M.O., Awe, A.A.
Microstructure, mechanical and fracture properties of groundnut shell ash and silicon carbide dispersion strengthened aluminium matrix composites (Open Access)

(2018) *Journal of King Saud University - Engineering Sciences*, 30 (1), pp. 96-103. Cited 54 times.
www.journals.elsevier.com/journal-of-king-saud-university-engineering-sciences/
doi: 10.1016/j.jksues.2016.01.001

View at Publisher

19 Poornesh, M., Saldanha, J.X., Singh, J., Pinto, G.M.
Comparison of mechanical properties of coconut shell ash and SiC reinforced hybrid aluminium metal matrix composites
(2017) *Am J Mater Sci*, 7, pp. 116-119. Cited 8 times.

20 Abdulwahab, M., Umaru, O.B., Bawa, M.A., Jibo, H.A.
Microstructural and thermal study of Al-Si-Mg/melon shell ash particulate composite (Open Access)

(2017) *Results in Physics*, 7, pp. 947-954. Cited 8 times.
http://www.elsevier.com.ezlib.iium.edu.my/wps/find/journaldescription.cws_home/725996/description#description
doi: 10.1016/j.rinp.2017.02.016

View at Publisher

21 Safiuddin, M., Jumaat, M.Z., Salam, M.A., Islam, M.S., Hashim, R.
Utilization of solid wastes in construction materials

(2010) *International Journal of Physical Sciences*, 5 (13), pp. 1952-1963. Cited 130 times.
http://www.academicjournals.org/ijps/PDF/pdf2010/18%20Oct/Safiuddin%20et%20al.pdf

22 Maleque, M.A., Atiqah, A.
Development and Characterization of Coir Fibre Reinforced Composite Brake Friction Materials

(2013) *Arabian Journal for Science and Engineering*, 38 (11), pp. 3191-3199. Cited 25 times.
https://link-springer-com.ezlib.iium.edu.my/journal/13369
doi: 10.1007/s13369-012-0454-4

View at Publisher

23 Siva Prasad, D., Rama Krishna, A.
Production and mechanical properties of A356. 2 / RHA composites
(2011) *Int J Adv Sci Technol Prod*, 33, pp. 51-58. Cited 91 times.

24 Zuhailawati, H., Samayamutthirian, P., Haizu, C.H.M., Campus, E., Pinang, P.
Fabrication of low cost of aluminium matrix composite reinforced with silica sand
(2007) *J Phys Sci*, 18, pp. 47-55. Cited 30 times.
COI: 1:CAS:528:DC%2BD1cXisVygsLg%3D

25 Kanthavel, K., Sumesh, K.R., Saravanakumar, P.
Study of tribological properties on $Al/Al_2O_3/MoS_2$ hybrid composite processed by powder metallurgy (Open Access)

(2016) *Alexandria Engineering Journal*, 55 (1), pp. 13-17. Cited 71 times.
http://www.elsevier.com.ezlib.iium.edu.my/wps/find/journaldescription.cws_home/724292/description#description
doi: 10.1016/j.aej.2016.01.024

View at Publisher

26 Baradeswaran, A., Elaya Perumal, A.
Study on mechanical and wear properties of Al 7075/Al_2O_3/graphite hybrid composites

(2014) *Composites Part B: Engineering*, 56, pp. 464-471. Cited 336 times.
doi: 10.1016/j.compositesb.2013.08.013

View at Publisher

27 Adebisi, A.A., Maleque, M.A., Ali, M.Y., Bello, K.A.
Effect of variable particle size reinforcement on mechanical and wear properties of 6061Al-SiC_p composite

(2016) *Composite Interfaces*, 23 (6), pp. 533-547. Cited 19 times.
http://www-tandfonline-com.ezlib.iium.edu.my/toc/tcoi20/current
doi: 10.1080/09276440.2016.1167414

View at Publisher

28 Tiwari, S., Pradhan, M.K.
Effect of rice husk ash on properties of aluminium alloys: A review

(2017) *Materials Today: Proceedings*, Part A 4 (2), pp. 486-495. Cited 32 times.
http://www.journals.elsevier.com/materials-today-proceedings/
doi: 10.1016/j.matpr.2017.01.049

View at Publisher

29 Kulkarni, P.P., Siddeswarappa, B., Kumar, K.S.H.
A survey on effect of agro waste ash as reinforcement on aluminium base metal matrix composites
(2019) *Open J Compos Mater*, 9, pp. 312-326. Cited 4 times.

30 Bhattacharya, S.C.
State-of-the-art of utilizing residues and other types of biomass as an energy source

(1993) *RERIC International Energy Journal*, 15 (1), pp. 1-23. Cited 21 times.

31 Aigbodion, V.
Development of Al-Si-Fe/Rice husk ash particulate composites synthesis by double stir casting method
(2012) *Usak Univ J Mater Sci*, 1, pp. 187-197. Cited 22 times.
COI: 1:CAS:528:DC%2BC2cXhsVSgs7bE

32 Kumar, N.S.
Fabrication and characterization of Al7075 / RHA /Mica composite by squeeze casting

(2020) *Materials Today: Proceedings*, Part 2 37 (Part 2), pp. 750-753. Cited 3 times.
http://www.journals.elsevier.com/materials-today-proceedings/
doi: 10.1016/j.matpr.2020.05.769

View at Publisher

33 Bakar, R.A., Yahya, R., Gan, S.N.
Production of high purity amorphous silica from rice husk
(2016) *Procedia Chem*, 19, pp. 189-195. Cited 175 times.

34 Bazargan, A., Bazargan, M., McKay, G.
Optimization of rice husk pretreatment for energy production

(2015) *Renewable Energy*, 77, pp. 512-520. Cited 54 times.
http://www.journals.elsevier.com/renewable-and-sustainable-energy-reviews/
doi: 10.1016/j.renene.2014.11.072

View at Publisher

35 Verma, N., Vettivel, S.C.
Characterization and experimental analysis of boron carbide and rice husk ash reinforced AA7075 aluminium alloy hybrid composite

(2018) *Journal of Alloys and Compounds*, 741, pp. 981-998. Cited 49 times.
doi: 10.1016/j.jallcom.2018.01.185

View at Publisher

36 Joharudin, N.F.M., Latif, N.A., Mustapa, M.S., Badarulzaman, N.A., Mahmod, M.F.
Effect of burning temperature on rice husk silica as reinforcement of recycled aluminium chip AA7075 (Open Access)

(2020) *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences*, 68 (1), pp. 125-132.
http://www.akademiabaru.com/doc/ARFMTSV68_N1_P125_132.pdf
doi: 10.37934/ARFMTS.68.1.125132

View at Publisher

37 Alaneme, K.K., Sanusi, K.O.
Microstructural characteristics, mechanical and wear behaviour of aluminium matrix hybrid composites reinforced with alumina, rice husk ash and graphite (Open Access)

(2015) *Engineering Science and Technology, an International Journal*, 18 (3), pp. 416-422. Cited 117 times.
www.journals.elsevier.com/engineering-science-and-technology-an-international-journal/
doi: 10.1016/j.jestch.2015.02.003

View at Publisher

38 Narasaraju, G., Raju, D.L.
Characterization of Hybrid Rice Husk and Fly ash-Reinforced Aluminium alloy (AlSi10Mg) Composites

(2015) *Materials Today: Proceedings*, 2 (4-5), pp. 3056-3064. Cited 41 times.
http://www.journals.elsevier.com/materials-today-proceedings/
doi: 10.1016/j.matpr.2015.07.245

View at Publisher

39 Usman, A.M.
Raji1 A, Hassan MA, Waziri and NH. Influence of particulate loading on the mechanical properties of Al-4.5 Cu/GSA composite
(2014) *Int J Eng Sci*, 3, pp. 1-7. Cited 12 times.

40 Ravi Kumar, K., Pridhar, T., Sree Balaji, V.S.
Mechanical properties and characterization of zirconium oxide (ZrO_2) and coconut shell ash(CSA) reinforced aluminium (Al 6082) matrix hybrid composite

(2018) *Journal of Alloys and Compounds*, 765, pp. 171-179. Cited 65 times.
doi: 10.1016/j.jallcom.2018.06.177

View at Publisher

41 Babu, R.B.M.R.
Effect of mechanical properties on palm sprout shell ash reinforced with Al-6061 alloy metal matrix composites
(2019) *Int J Sci Res Eng Trends*, 5, pp. 2395-2566.

42 Virkunwar, A.K., Ghosh, S., Basak, R.
Study of mechanical and tribological characteristics of aluminium alloy reinforced with sugarcane bagasse ash
(2019) *SSRN Electron J*

43 Baharin, S., Universiti, J.
Analysis of worn surfaces of palm shell activated carbon (Psac) reinforced aluminium matrix
(2011) *Eng e-Trans*, 6, pp. 156-160. Cited 3 times.

44 Emeruwa, O.E., Nnakwo, K.C., Atuanya, C.U.
Investigative study of the structure and mechanical behaviour of horse eye bean seed shell ash reinforced aluminium alloy matrix composite
(2017) *Int J Sci Res Sci Eng Technol*, 3, pp. 8-13.

45 Kamal, T., Siddiqui, M.A.
Evaluation of mustard husk ash as reinforcement for aluminium matrix composite

(2018) *Materials Research Express*, 5 (8), art. no. 086509. Cited 5 times.
http://iopscience.iop.org/article/10.1088/2053-1591/aad0e7/pdf
doi: 10.1088/2053-1591/aad0e7

View at Publisher

46 Odoni, B.U., Odikpo, F., Chinasa, N.C., Akaluzia, R.O.
Experimental analysis, predictive modelling and optimization of some physical and mechanical properties of aluminium 6063 alloy based composites reinforced with corn cob ash
(2020) *J Mater Eng Struct*, 7, pp. 451-465. Cited 2 times.
COI: 1:CAS:528:DC%2BB3MXovFanu7o%3D

47 Ikubanni, P.P., Oki, M., Adeleke, A.A., Adediran, A.A., Agboola, O.O., Babayeju, O., Egbo, N., (...), Omiogbemi, I.M.B.
Tribological and physical properties of hybrid reinforced aluminium matrix composites
(2021) *Mater Today Proc*

48 Ebenezer, N.S., Vinod, B., Jagadesh, H.S.
Corrosion Behaviour of Bamboo Leaf Ash-Reinforced Nickel Surface-Deposited Aluminium Metal Matrix Composites

(2021) *Journal of Bio- and Tribo-Corrosion*, 7 (2), art. no. 72.
http://www.springer.com.ezlib.iium.edu.my/materials/surfaces+interfaces/journal/40735
doi: 10.1007/s40735-021-00510-x

View at Publisher

49 Yevich, R., Logan, J.A.
An assessment of biofuel use and burning of agricultural waste in the developing world

(2003) *Global Biogeochemical Cycles*, 17 (4), pp. 6-1 - 6-40. Cited 417 times.
http://agupubs.onlinelibrary.wiley.com.ezlib.iium.edu.my/hub/journal/10.1002/(ISSN)1944-9224/
doi: 10.1029/2002gb001952

View at Publisher

50 Sarkar, J.K., Wang, Q.
Different pyrolysis process conditions of South Asian waste coconut shell and characterization of gas, bio-char, and bio-oil (Open Access)

(2020) *Energies*, 13 (8), art. no. 1970. Cited 12 times.
https://www.mdpi.com/1996-1073/13/8/1970
doi: 10.3390/en13081970

View at Publisher

51 Satheesh, M., Pugazhvadivu, M.
Investigation on physical and mechanical properties of Al6061-Silicon Carbide (SiC)/Coconut shell ash (CSA) hybrid composites

(2019) *Physica B: Condensed Matter*, 572, pp. 70-75. Cited 12 times.
http://www.journals.elsevier.com/physica-b-condensed-matter/
doi: 10.1016/j.physb.2019.07.058

View at Publisher

52 Kaladgi, A.R.R., Rehman, K.F., Afzal, A., Baig, M.A., Soudagar, M.E.M., Bhattacharyya, S.
Fabrication characteristics and mechanical behaviour of aluminium alloy reinforced with Al2O3 and coconut shell particles synthesized by stir casting
(2021) *IOP Conf Ser Mater Sci Eng*, 1057, p. 12017.

53 Bello, S.A., Raheem, I.A., Raji, N.K.
Study of tensile properties, fractography and morphology of aluminium (1xxx)/coconut shell micro particle composites (Open Access)

(2017) *Journal of King Saud University - Engineering Sciences*, 29 (3), pp. 269-277. Cited 30 times.
www.journals.elsevier.com/journal-of-king-saud-university-engineering-sciences/
doi: 10.1016/j.jksues.2015.10.001

View at Publisher

54 Bannaravuri, P.K., Birru, A.K.
Strengthening of Al-4.5%Cu alloy with the addition of Silicon Carbide and Bamboo Leaf Ash

(2019) *International Journal of Structural Integrity*, 10 (2), pp. 149-161. Cited 3 times.
http://www.emeraldinsight.com.ezlib.iium.edu.my/info/journals/ijsi/ijsi.jsp
doi: 10.1108/IJSI-03-2018-0018

View at Publisher

55 Shridhara, K.T., Hanumnthlal, S., Annoji Rao, T.M.
Characterisation of Aluminium-Copper Alloy with Bamboo Leaf Ash and Graphite Metal Matrix Composites
(2015) *Int J Eng Res*, V4, pp. 446-450. Cited 3 times.
https://doi-org.ezlib.iium.edu.my/10.17577/ijertv4is070374

56 Alaneme, K.K., Olubambi, P.A., Afolabi, A.S., Bodurin, M.O.
Corrosion and tribological studies of bamboo leaf ash and alumina reinforced Al-Mg-Si alloy matrix hybrid composites in chloride medium

(2014) *International Journal of Electrochemical Science*, 9 (10), pp. 5663-5674. Cited 31 times.
http://www.electrochemsci.org/papers/vol9/91005663.pdf

57 Usman, A.M., Raji, A., Waziri, N.H., Hassan, M.A.
Aluminium alloy - rice husk ash composites production and analysis

(2014) *Leonardo Electronic Journal of Practices and Technologies*, 13 (25), pp. 84-98. Cited 12 times.
http://lejpt.academicdirect.org/A25/084_098.pdf

58 De Souza Rodrigues, C., Ghavami, K., Stroeven, P.
Rice husk ash as a supplementary raw material for the production of cellulose-cement composites with improved performance (Open Access)

(2010) *Waste and Biomass Valorization*, 1 (2), pp. 241-249. Cited 24 times.
doi: 10.1007/s12649-010-9017-7

View at Publisher

59 Madakson, P.B., Yawas, D.S., Apasi, A.
Characterization of coconut shell ash for potential utilization in metal matrix composites for automotive applications
(2012) *Int J Eng Sci Technol*, 4, pp. 1190-1198. Cited 71 times.

60 Amu, O.O., Adetuberu, A.A.
Characteristics of bamboo leaf ash stabilization on lateritic soil in highway construction

(2010) *International Journal of Engineering and Technology*, 2 (4), pp. 212-219. Cited 31 times.
http://www.enggjournals.com/ijet/docs/IJET10-02-04-04.pdf

61 Zainudin, N.F., Lee, K.T., Kamaruddin, A.H., Bhatia, S., Mohamed, A.R.
Study of adsorbent prepared from oil palm ash (OPA) for flue gas desulfurization

(2005) *Separation and Purification Technology*, 45 (1), pp. 50-60. Cited 98 times.
doi: 10.1016/j.seppur.2005.02.008

View at Publisher

62 Robani, R., Chan, C.
(2009) *Reusing Soft Soils with Cement-Palm Oil Clinker (POC) Stabilisation. Int Conf Eng Educ 21St Century*, pp. 1-4. Cited 14 times.

63 Ahmadi, R., Saiful, M.S., Zawawi, D.F., Rahman, S.Z.A., Ismail, I., Mannan, A.B., Abidin, A.S.Z.
Production and Characterisation of Microfine Sized Palm Oil Fuel Ash (POFA) Originated from Bau, Lundu Palm Oil Mill (Open Access)

(2016) *MATEC Web of Conferences*, 87, art. no. 01011. Cited 6 times.
http://www.matec-conferences.org/
doi: 10.1051/matecconf/20178701011

View at Publisher

64 Hashimah, N., Mohamad, B.
(2019) *The Utilization of Palm Oil Fuel Ash in Aluminium Metal Matrix Composites Materials*

65 Shigetomi, Y., Ishimura, Y., Yamamoto, Y.
Trends in global dependency on the Indonesian palm oil and resultant environmental impacts (Open Access)

(2020) *Scientific Reports*, 10 (1), art. no. 20624. Cited 2 times.
www.nature.com/srep/index.html
doi: 10.1038/s41598-020-77458-4

View at Publisher

66 Ahmad, M.H., Noor, N.M.
Physical Properties of Local Palm Oil Clinker And Fly Ash
(2007) *1St Eng Conf Energy Environ*, pp. 1-6. Cited 20 times.

67 Zamri, Y.B., Shamsul, J.B., Amin, M.M.
Potential of palm oil clinker as reinforcement in aluminium matrix composites for tribological applications

(2011) *International Journal of Mechanical and Materials Engineering*, 6 (1), pp. 10-17. Cited 22 times.

68 Hernández-Salas, J.M., Villa-Ramírez, M.S., Veloz-Rendón, J.S., Rivera-Hernández, K.N., González-César, R.A., Plascencia-Espinosa, M.A., Trejo-Estrada, S.R.

Comparative hydrolysis and fermentation of sugarcane and agave bagasse

(2009) *Bioresource Technology*, 100 (3), pp. 1238-1245. Cited 137 times.
doi: 10.1016/j.biortech.2006.09.062

View at Publisher

69 Sn, W.
Sugarcane bagasse: how easy is it to measure it's constituents ?
(2008) *Proc S Afr Sug Technol Ass*, 81, pp. 266-273. Cited 17 times.

70 Usman, A.M., Raji, A., Hassan, M.A., Waziri, N.H.
A comparative study on the properties of Al-7%Si-rice husk ash and Al-7%Si-bagasse ash composites produced by stir casting
(2014) *Int J Eng Sci*, 3, pp. 1-7. Cited 12 times.

71 Kamble, A., Kulkarni, S.G.

Microstructural examination of bagasse ash reinforced waste aluminium alloy matrix composite

(2019) *AIP Conference Proceedings*, 2105, art. no. 020011.
http://scitation.aip.org/content/aip/proceeding/aipcp
ISBN: 978-073541837-0
doi: 10.1063/1.5100696

View at Publisher

72 Chandla, N.K., Yashpal, Kant, S., Goud, M.M., Jawalkar, C.S.

Experimental analysis and mechanical characterization of Al 6061/alumina/bagasse ash hybrid reinforced metal matrix composite using vacuum-assisted stir casting method

(2020) *Journal of Composite Materials*, 54 (27), pp. 4283-4297. Cited 6 times.
http://jcm.sagepub.com/content/by/year
doi: 10.1177/0021998320929417

View at Publisher

73 Edoziuno, F.O., Adediran, A.A., Odoni, B.U., Utu, O.G., Olayanju, A.

Physico-chemical and morphological evaluation of palm kernel shell particulate reinforced aluminium matrix composites

(2021) *Materials Today: Proceedings*, Part 2 38, pp. 652-657. Cited 5 times.
http://www.journals.elsevier.com/materials-today-proceedings/
doi: 10.1016/j.matpr.2020.03.641

View at Publisher

74 Adediran, A.A., Alaneme, K.K., Oladele, I.O., Akinlabi, E.T.

Wear characteristics of aluminium matrix composites reinforced with Si-based refractory compounds derived from rice husks (Open Access)

(2020) *Cogent Engineering*, 7 (1), art. no. 1826634. Cited 3 times.
https://www.cogentoa.com/journal/engineering
doi: 10.1080/23311916.2020.1826634

View at Publisher

75 Tyagi, L., Butola, R., Jha, A.K.

Mechanical and tribological properties of AA7075-T6 metal matrix composite reinforced with ceramic particles and aloevera ash via Friction stir processing (Open Access)

(2020) *Materials Research Express*, 7 (6), art. no. 066526. Cited 16 times.
https://iopscience.iop.org/article/10.1088/2053-1591/ab9c5e
doi: 10.1088/2053-1591/ab9c5e

View at Publisher

76 Joharudin, N.F.M., Latif, N.A., Mustapa, M.S., Badarulzaman, N.A.

Effects of untreated and treated rice husk ash (RHA) addition on physical properties of recycled aluminium chip AA7075

(2020) *International Journal of Integrated Engineering*, 12 (1), pp. 132-137.
penerbit.uthm.edu.my/ojs/index.php/ijie/index

77 Mohd Joharudin, N.F., Latif, N.A., Mustapa, M.S., Badarulzaman, N.A., Mahmod, M.F.

Physical Properties and Hardness of Treated Amorphous Silica as Reinforcement of AA7075 Recycled Aluminum Chip (Open Access)

(2020) *IOP Conference Series: Materials Science and Engineering*, 824 (1), art. no. 012015.
https://iopscience.iop.org/journal/1757-899X
doi: 10.1088/1757-899X/824/1/012015

View at Publisher

78 Alaneme, K.K., Babalola, S.A., Chown, L.H., Bodunrin, M.O.

Hot deformation behaviour of bamboo leaf ash-silicon carbide hybrid reinforced aluminium based composite (Open Access)

(2020) *Manufacturing Review*, 7, art. no. 2020014.
https://mfr.edp-open.org/
doi: 10.1051/mfreview/2020014

View at Publisher

79 Saini, S., Gupta, A., Mehta, A.J., Pramanik, S.

Rice husk-extracted silica reinforced graphite/aluminium matrix hybrid composite

(2020) *Journal of Thermal Analysis and Calorimetry*
http://www.springer.com.ezlib.iium.edu.my/sgw/cda/frontpage/0,11855,1-40109-70-35752391-0,00.html
doi: 10.1007/s10973-020-10404-8

View at Publisher

80 Marini, C.D., Fatchurrohman, N., Zulkfli, Z.
Investigation of wear performance of friction stir processed aluminium metal matrix composites
(2020) *Mater Today Proc*

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