
References

- Acıkalın K, Karaca F, Bolat E (2012) Pyrolysis of pistachio shell: effects of pyrolysis conditions and analysis of products. *Fuel* 169:169-177.
- Agbor VB, Cicek N, Sparling R, Berlin A, Levin DB (2011) Biomass pretreatment: fundamentals toward application. *Biotechnol Adv* 29(6):675-685.
- Agnihotri N, Gupta GK, Mondal MK (2022) Thermo-kinetic analysis, thermodynamic parameters and comprehensive pyrolysis index of *Melia azedarach* sawdust as a genesis of bioenergy. *Biomass Conv Bioref* 1-8.
- Agnihotri N, Mondal MK (2022) Catalytic pyrolysis for upgrading of biooil obtained from biomass. In: *Biofuels and bioenergy*. Elsevier, pp 495–509.
- Agnihotri N, Mondal MK (2023a) Process parameter variation of *Melia azedarach* sawdust pyrolysis for fuel properties, physicochemical characterization, and in-depth speciation analysis. *Biomass Conv Bioref* 1-5.
- Agnihotri N, Mondal MK (2023b) Thermal analysis, kinetic behavior, reaction modeling, and comprehensive pyrolysis index of soybean stalk pyrolysis. *Biomass Conv Bioref*.
- Ahmad AA, Zawawi NA, Kasim FH, Inayat A, Khasri A (2016) Assessing the gasification performance of biomass: A review on biomass gasification process conditions, optimization and economic evaluation. *Renew Sust Energ Rev* 1; 53:1333-1347.
- Ahmad MS, Kleme JJ, Alhumade H, Elkamel A, Mahmood A, Shen B, et al. (2021) Thermo-kinetic study to elucidate the bioenergy potential of Maple Leaf Waste (MLW) by pyrolysis, TGA and kinetic modelling. *Fuel* 293:120349.

- Ahmad MS, Mehmood MA, Ayed OSA, Ye G, Luo H, Ibrahim M et al. (2017a) Kinetic analyses and pyrolytic behavior of Para grass (*Urochloa mutica*) for its bioenergy potential. *Bioresour Technol* 224:708–713.
- Ahmad MS, Mehmood MA, Taqvi STH, Elkamel A, Liu CG, Ren X, et al. (2017b) Pyrolysis, kinetics analysis, thermodynamics parameters and reaction mechanism of *Typha latifolia* to evaluate its bioenergy potential. *Bioresour Technol* 245:491–501.
- Ahmed A, Bakar MS, Sukri RS, Hussain M, Farooq A, Moogi S, Park YK (2020) Sawdust pyrolysis from the furniture industry in an auger pyrolysis reactor system for biochar and bio-oil production. *Energy Convers Manag* 15(226):113502.
- Akahira T, Sunose T (1971) Method of determining activation deterioration constant of electrical insulating materials. *Research Report: Chiba Inst. of Technol* 16:22-23.
- Akyurek Z (2019) Sustainable Valorization of Animal Manure and Recycled Polyester: Co-pyrolysis Synergy. *Sustainability* 11:2280.
- Alam M, Bhavanam A, Jana A, Peela NR (2020) Co-pyrolysis of bamboo sawdust and plastic: synergistic effects and kinetics. *Renew Energ* 149:1133-1145.
- Al-Layla NMT, Saleh LA, Fadhil AB (2021) Liquid bio-fuels and carbon adsorbents production via pyrolysis of non-edible feedstock. *J Anal Appl Pyrolysis* 156:105088.
- Altamer DH, Al-Irhayim AN, Saeed LI (2021) Bio-based liquids and solids from sustainable feedstock: Production and analysis. *J Anal Appl Pyrolysis* 157:105224.
- Alves JLF, Silva JCG, Domenico MD, Galdino WVDA, Andersen SLF, Alves RF et al. (2021) Exploring açai seed (*Euterpe oleracea*) pyrolysis using multi-

- component kinetics and thermodynamics assessment towards its bioenergy potential. *Bioenergy Res* 14:209–225.
- Alves JLF, Silva JCG, Languer MP, Batistella L, Domenico MD, Filho VFS, et al., (2020) Assessing the bioenergy potential of high-ash anaerobic sewage sludge using pyrolysis kinetics and thermodynamics to design a sustainable integrated biorefinery. *Biomass Conv Bioref*.
 - Ansari KB, Gaikar VG (2019) Investigating production of hydrocarbon rich bio-oil from grassy biomass using vacuum pyrolysis coupled with online deoxygenation of volatile products over metallic iron. *Renew Energ* 130:305-318.
 - Apaydin-Varol E, Uzun BB, Önal E, Pütün AE (2014) Synthetic fuel production from cottonseed: fast pyrolysis and a TGA/FT-IR/MS study. *J Anal Appl Pyrolysis* 105:83-90.
 - Arazo RO, Genuino DAD, de Luna MDG, Capareda SC (2017) Bio-oil production from dry sewage sludge by fast pyrolysis in an electrically-heated fluidized bed reactor. *Sustain Environ Res* 27(1):7-14.
 - Arif M, Li Y, El-Dalatony MM, Zhang C, Li X, Salama ES (2021) A complete characterization of microalgal biomass through FTIR/TGA/CHNS analysis: An approach for biofuel generation and nutrients removal. *Renew Energy* 163:1973-1982.
 - Asadullah M, Rahman MA, Ali MM, Rahman MS, Motin MA, Sultan MB, et al. (2007) Production of bio-oil from fixed bed pyrolysis of bagasse. *Fuel* 86:2514–2520.
 - Azura NW, Zularisam AW, Norsita S, Nasrullah M, Kamaruzaman NW (2017) Effect of fast pyrolysis operating conditions on product yield of red meranti sawdust. *Int Res J Eng Technol* 4:607–611.

- Behrendt F, Neubauer Y, Oevermann M, Wilmes B, Zobel N (2008) Direct liquefaction of biomass. *Chem Eng Technol: Industrial Chemistry-Plant Equipment-Process Engineering-Biotechnology*. 31(5):667-677.
- Bhattacharjee N, Biswas AB (2019) Pyrolysis of *Alternanthera philoxeroides* (alligator weed): Effect of pyrolysis parameter on product yield and characterization of liquid product and bio char. *J Energy Inst* 1(4):605-618.
- Biswas B, Pandey N, Bisht Y, Singh R, Kumar J, Bhaskar T (2017) Pyrolysis of agricultural biomass residues: Comparative study of corn cob, wheat straw, rice straw and rice husk. *Bioresour Technol* 237:57-63.
- Braga RM, Melo DMA, Aquino FM, Freitas JCO, Melo MAF, Barros JMF, et al. (2020) Characterization and comparative study of pyrolysis kinetics of the rice husk and the elephant grass. *J Therm Anal Calorim* 115:1915–1920.
- Bridgwater AV (2003) Renewable fuels and chemicals by thermal processing of biomass. *Chem Eng J* 91(2-3):87-102.
- Buyang Y, Suprpto S, Nugraha RE, Holilah H, Bahruji H, Hantoro R, Jalil AA, Oetami TP, Prasetyoko D (2023) Catalytic pyrolysis of *Reutealis trisperma* oil using raw dolomite for bio-oil production. *J Anal Appl Pyrolysis* 169, 105852.
- Cao H, Xin Y, Wang D, Yuan Q (2014) Pyrolysis characteristics of cattle manures using a discrete distributed activation energy model. *Bioresour Technol* 172:219–225.
- Casoni AI, Bidegain M, Cubitto MA, Curvetto N, Volpe MA (2015) Pyrolysis of sunflower seed hulls for obtaining bio-oils. *Bioresour Technol* 177:406-409.
- Chai Y, Bai M, Chen A, Peng L, Shao J, Shang C, Peng C, Zhang J, Zhou Y (2022a) Thermochemical conversion of heavy metal contaminated biomass: Fate of the metals and their impact on products. *Sci Total Environ* 822:153426.

-
-
- Chai Y, Bai M, Chen A, Yuan J, Peng C, Zhao D, Yan B, Qin A (2022b) Cr-Mn bimetallic functionalized USY zeolite monolithic catalyst for direct production of 2, 5-furandicarboxylic acid from raw biomass. *Chem Eng J* 429:13217.
 - Chai Y, Chen A, Bai M, Peng L, Shao J, Yuan J, Shang C, Zhang J, Huang H, Peng C (2022c) Valorization of heavy metal contaminated biomass: Recycling and expanding to functional materials. *J Clean Prod* 366:132771.
 - Chami ZA, Amer N, Smets K, Yperman J, Carleer R, Dumontet S, Vangronsveld J (2014) Evaluation of flash and slow pyrolysis applied on heavy metal contaminated Sorghum bicolor shoots resulting from phytoremediation. *Biomass Bioenergy* 63:268-279.
 - Chen C, Yang Q, Zhang R, Liu D (2022) Assessment on combustion chemistry of coal volatiles for various pyrolysis temperatures. *J Energy Inst* 104:22-34.
 - Chen P, Sun X, Gao M, Ma J, Guo Q (2019) Transformation and migration of cadmium during chemical-looping combustion/gasification of municipal solid waste. *Chem Eng J* 365: 389-399.
 - Cheng S, Shu J, Xia H, Wang S, Zhang L, Peng J, Li C, Jiang X, Zhang Q (2019) Pyrolysis of crofton weed for the production of aldehyde rich bio-oil and combustible matter rich bio-gas. *Appl Therm Eng* 148:1164-1170.
 - Chikri R, Elhadiri N, Benchanaa El, Maguana, Y (2020) Efficiency of sawdust as low-cost adsorbent for dyes removal. *J Chem* 1-17.
 - Chukwuneke JL, Ewulonu MC, Chukwujike IC, Okolie PC (2019) Physico-chemical analysis of pyrolyzed bio-oil from swietenia macrophylla (mahogany) wood. *Heliyon* 5(6):e01790.

- Collard FX, Blin J (2014) A review on pyrolysis of biomass constituents: Mechanisms and composition of the products obtained from the conversion of cellulose, hemicelluloses and lignin. *Renew Sust Energ Rev* 38:594-608.
- Da Silva JC, Alves JL, Mumbach GD, Andersen SL, Moreira RD, Jose HJ (2022) Torrefaction of low-value agro-industrial wastes using macro-TGA with GC-TCD/FID analysis: Physicochemical characterization, kinetic investigation, and evolution of non-condensable gases. *J Anal Appl Pyrolysis* 166:105607.
- Dahal R, Acharya B, Farooque A (2018) Biochar: a sustainable solution for solid waste management in agro-processing industries. *Biofuels* 12:237-245.
- Daugaard DE, Brown RC D (2003) Enthalpy for pyrolysis for several types of biomass. *Energy Fuels* 17:934–939.
- Dave A, Gupta GK, Mondal MK (2021) Study on thermal degradation characteristics, kinetics, thermodynamic, and reaction mechanism analysis of *Arachis hypogaea* shell pyrolysis for its bioenergy potential. *Biomass Conv Bioref*.
- Demiral I, Eryazıcı A, Sensoz S (2012) Bio-oil production from pyrolysis of corncob (*Zea mays* L.). *Biomass Bioenergy* 36:43-49.
- Diao R, Wang C, Luo Z, Zhu X (2021) The valorization of co-pyrolysis bio-oil derived from bio-oil distillation residue and walnut shell via coupling fractional condensation and lyophilization. *J Clean Prod* 294:126263.
- Dimitriadis A, Bezergianni S (2017) Hydrothermal liquefaction of various biomass and waste feedstocks for biocrude production: A state of the art review. *Renew Sust Energ Rev* 68:113-125.

-
-
- Doddapaneni TRKC, Konttinen J, Hukka TI, Moilanen A (2016) Influence of torrefaction pretreatment on the pyrolysis of eucalyptus clone: a study on kinetics, reaction mechanism and heat flow. *Ind Crop Prod* 92:244–254.
 - Dong Z, Yang H, Chen P, Liu Z, Chen Y, Wang L, Wang X, Chen H (2019) Lignin characterization and catalytic pyrolysis for phenol-rich oil with TiO₂-based catalysts, *Energ Fuel* 33:9934–9941.
 - Doshi P, Srivastava G, Pathak G, Dikshit M (2014) Physicochemical and thermal characterization of nonedible oilseed residual waste as sustainable solid biofuel. *Waste Manage* 34:1836–1846.
 - Doyle CD (1965) Series approximations to the equation of thermogravimetric data. *Nature* 207(4994):290–291.
 - EL-Sayed S, Mostafa ME (2021) Kinetics, thermodynamics, and combustion characteristics of Poinciana pods using TG/DTG/DTA techniques. *Biomass Conv Bioref*.
 - El-Sayed SA, Mostafa ME (2014) Pyrolysis characteristics and kinetic parameters determination of biomass fuel powders by differential thermal gravimetric analysis (TGA/DTG). *Energy Convers Manag* 85:165-172.
 - Fadhil AB (2020) Production and characterization of liquid biofuels from locally available nonedible feedstocks. *Asia-Pac J Chem Eng* 16:2572-2591.
 - Fadhil AB, Kareem BA (2021) Co-pyrolysis of mixed date pits and olive stones: identification of bio-oil and the production of activated carbon from bio-char. *J Anal Appl Pyrolysis*. 158:105249.
 - Fan Y, Lu D, Wang J, Kawamoto H (2022) Thermochemical behaviors, kinetics and bio-oils investigation during co-pyrolysis of biomass components and polyethylene based on simplex-lattice mixture design. *Energy* 239:122235.

- Flynn J, Wall L (1966) A quick, direct method for the determination of activation energy from thermogravimetric data. *J Polymer Sci* 4(5):323-328.
- Font R, Fullana A, Conesa J (2005) Kinetic models for the pyrolysis and combustion of two types of sewage sludge. *J Anal Appl Pyrolysis* 74:429-438.
- Gajera B, Panwar NL (2019) Pyrolysis and kinetic behaviour of black gram straw using thermogravimetric analysis. *Energy Sources A: Recovery Util Environ Eff* 45(1):2371-2384.
- Galwey AK, Brown ME (1999) Chapter 3 kinetic models for solid state reactions. In: Galwey AK, Brown ME, editors. *Studies in physical and theoretical chemistry*. New York: Elsevier 75–115.
- Gašparović L (2012) Calculation of kinetic parameters of the thermal decomposition of wood by distributed activation energy model (DAEM). *Chem Biochem Eng Q* 26:45–53.
- Gaurh P, Pramanik H (2018) A novel approach of solid waste management via aromatization using multiphase catalytic pyrolysis of waste polyethylene. *Waste Manage* 71:86–96.
- Gautam A, Mondal MK (2023a) Post-combustion capture of CO₂ using novel aqueous Triethylenetetramine and 2-Dimethylaminoethanol amine blend: Equilibrium CO₂ loading-empirical model and optimization, CO₂ desorption, absorption heat, and ¹³C NMR analysis. *Fuel* 331, 125864.
- Gautam A, Mondal MK (2023b) Review of recent trends and various techniques for CO₂ capture: special emphasis on biphasic amine solvents. *Fuel* 334(1):126616.
- Guedes RE, Luna AS, Torres AR (2018) Operating parameters for bio-oil production in biomass pyrolysis: a review. *J Anal Appl Pyrolysis* 129:134-149.

-
-
- Gupta GK, Gupta PK, Mondal MK (2019) Experimental process parameters optimization and in-depth product characterizations for teak sawdust pyrolysis. *Waste Manage* 87:499–511.
 - Gupta GK, Mondal MK (2018) Iso-conversional kinetic and thermodynamic studies of Indian sagwan sawdust pyrolysis for its bioenergy potential. *Environ Prog Sustain Energy* 38(4):13131.
 - Gupta GK, Mondal MK (2019a) Bio-energy generation from sagwan sawdust via pyrolysis: Product distributions, characterizations and optimization using response surface methodology. *Energy* 170:423-437.
 - Gupta GK, Mondal MK (2019b) Kinetics and thermodynamic analysis of maize cob pyrolysis for its bioenergy potential using thermogravimetric analyzer. *J Therm Anal Calorim* 137(4):1431– 1441.
 - Gupta S, Mondal P (2021) Catalytic pyrolysis of pine needles with nickel doped gamma-alumina: reaction kinetics, mechanism, thermodynamics and products analysis. *J Clean Prod* 286:124930.
 - Han Z, Guo Z, Zhang Y, Xiao X, Xu Z, Sun Y (2018) Pyrolysis characteristics of biomass impregnated with cadmium, copper and lead: influence and distribution. *Waste Biomass Valori* 9:1223–1230.
 - Hanandeh AE, Albalasmeh A, Gharaibeh M (2021) Effect of pyrolysis temperature and biomass particle size on the heating value of biocoal and optimization using response surface methodology. *Biomass Bioenergy* 151:106163.
 - Haykiri-Acma H, Yaman S (2008) Effect of co-combustion on the burnout of lignite/biomass blends: a Turkish case study. *Waste Manag* 28:2077-2084.

- He J, Strezov V, Kumar R, Weldekidan H, Jahan S, Dastjerdi BH, Zhou X, Kan T (2019a) Pyrolysis of heavy metal contaminated *Avicennia marina* biomass from phytoremediation: Characterisation of biomass and pyrolysis products. *J Clean Prod* 234:1235-1245.
- He J, Strezov V, Zhou X, Kumar R, Weldekidan H, Kan T (2021) Effects of co-pyrolysis of heavy metal contaminated biomass with magnesium carbonate on heavy metal department and pyrolytic product properties. *Fuel* 294:120545.
- He P, Liu Y, Shao L, Zhang H, Lu F (2018) Particle size dependence of the physicochemical properties of biochar. *Chemosphere* 212:385–392.
- He P, Shan W, Xiao Y, Song H (2016) Performance of Zn/ZSM-5 for in situ catalytic upgrading of pyrolysis bio-oil by methane. *Top Catal* 59:86–93.
- He Q, Ding L, Gong Y, Li W, Wei J, Yu G (2019b) Effect of torrefaction on pinewood pyrolysis kinetics and thermal behavior using thermogravimetric analysis. *Bioresour Technol* 280:104–111.
- Hu ZH, Yu HQ (2005) Application of rumen microorganisms for enhanced anaerobic fermentation of corn stover. *Process Biochem* 40(7):2371-2377.
- Huang J, Liu J, Chen J, Xie W, Kuo J, Lu X, et al. (2018) Combustion behaviors of spent mushroom substrate using TG-MS and TG-FTIR: thermal conversion, kinetic, thermodynamic and emission analyses. *Bioresour Technol* 266:389–397.
- Huang S, Su Y, Luo W, He Q, Huang S, Zhou N, Zhou Z (2021) Kinetic analysis and in-situ no support catalytic pyrolysis product distribution of Chinese herb residue. *J Anal Appl Pyrolysis* 156:105114.
- Huanga H, Liua J, Liua H, Evrendilekb F, Buyukadad M (2020) Pyrolysis of water hyacinth biomass parts: Bioenergy, gas emissions, and byproducts using

- TG-FTIR and Py-GC/MS analyses. *Energy Conversion and Management* 207:112552.
- Hussain M, Zhao Z, Ren J, Rasool T, Raza S (2019) Biomass and Bioenergy Thermokinetics and gaseous product analysis of banana peel pyrolysis for its bioenergy potential. *Biomass Bioenergy* 122:193–201.
 - Hwang H, Oh S, Cho TS, Choi IG, Choi JW (2013) Fast pyrolysis of potassium impregnated poplar wood and characterization of its influence on the formation as well as properties of pyrolytic products. *Bioresour Technol* 150:359-366.
 - Isikgor FH, Becer CR (2015) Lignocellulosic biomass: a sustainable platform for the production of bio-based chemicals and polymers. *Polym Chem* 6(25):4497-559
 - Jinshuai Y, Yicheng Z, Yongdan L (2014) Utilization of corn cob biochar in a direct carbon fuel cell. *J Power Sour* 270:312–317.
 - Junges J, Silvestre WP, Conto DD, Baldasso C, Osório E, Godinho M (2002) Non-isothermal kinetic study of fodder radish seed cake pyrolysis: performance of model-free and model-fitting methods. *Braz J Chem Eng* 37:139–155.
 - Kalita P, Kumar R (2007) Ce-Al-MCM-41: an efficient catalyst for Mukaiyama-Michael reaction. *Stud Surf Sci Catal* 170:1161-1166.
 - Kan T, Strezov V, Evans T (2014) Catalytic pyrolysis of coffee grounds using NiCu-impregnated catalysts. *Energ Fuel* 28(1):228-235.
 - Kan T, Strezov V, Evans TJ (2016) Lignocellulosic biomass pyrolysis: A review of product properties and effects of pyrolysis parameters. *Renew Sust Energ Rev* 57:1126-1140.
 - Khan A, Rahman MM, Ramesh M, Khan S, Asiri AM (2022) Furan Derivatives - Recent Advances and Applications.

- Khan AS, Man Z, Bustam MA, Kait CF, Ullah Z, Nasrullah A, Khan MI, Gonfa G, Ahmad P, Muhammad N (2016) Kinetics and thermodynamic parameters of ionic liquid pretreated rubber wood biomass. *J Mol Liq* 223:754-762.
- Khuenkaeo N, Phromphithak S, Onsree T, Naqvi SR, Tippayawong N (2021) Production and characterization of bio-oils from fast pyrolysis of tobacco processing wastes in an ablative reactor under vacuum. *PLoS One* 16 (7):e0254485.
- Kim P, Weaver S, Labbé N (2016) Effect of sweeping gas flow rates on temperature-controlled multistage condensation of pyrolysis vapors in an auger intermediate pyrolysis system. *J Anal Appl pyrolysis* 118:325-334.
- Kim S, Kim KT, Oh LS, Kim HJ, Lee J (2022) Marine waste upcycling—Recovery of nylon monomers from fishing net waste using seashell waste-derived catalysts in a CO₂-mediated thermocatalytic process. *J Mater Chem A* 37:20024-20034.
- Kim T, Oh S, Kim J, Choi I, Choi JW (2014) Study on the hydrodeoxygenative upgrading of crude bio-oil produced from woody biomass by fast pyrolysis. *Energy* 68:437-443.
- Kirti N, Tekade SP, Tagade A, Sawarkar AN (2022) Pyrolysis of pigeon pea (*Cajanus cajan*) stalk: Kinetics and thermodynamic analysis of degradation stages via isoconversional and master plot methods. *Bioresour Technol* 347:126440.
- Kissinger HE (1957) Reaction kinetics of differential thermal analysis. *Anal Chem* 29:1702-1706.
- Kistler RC, Widmer F, Brunner PH (1987) Behavior of chromium, nickel, copper, zinc, cadmium, mercury, and lead during the pyrolysis of sewage sludge. *Environ Sci Technol* 21(7):704-708.

-
-
- Knoetze, JH, Görgens JF, Thomas Johannes Hugo (2010) Pyrolysis of sugarcane bagasse. Department of Process Engineering at the University of Stellenbosch, Msc Thesis.
 - Koppolu L, Prasadb R, Clements LD (2004) Pyrolysis as a technique for separating heavy metals from hyperaccumulators. Part III: pilot-scale pyrolysis of synthetic hyperaccumulator biomass. *Biomass Bioenergy* 26:463–472.
 - Kristanto J, Daniyal AF, Pratama DY, Bening IN, Setiawan L, Azis MM, Purwono S (2022) Kinetic Study on The Slow Pyrolysis of Isolated Cellulose and Lignin from Teak Sawdust. *Thermochim Acta* 711:179202.
 - Kwikima MM, Chebude Y, Meshesha BT (2022) Kinetics, adsorption isotherms, thermodynamics, and desorption studies of cadmium removal from aqueous solutions using bamboo sawdust/rice husk biochar. *Biomass Conv Bioref*.
 - Laougé ZB, Merdun H (2021) Investigation of thermal behavior of pine sawdust and coal during co-pyrolysis and co-combustion. *Energy* 231:120895.
 - Li C, Li D, Jiang Y, Zhang L, Huang Y, Li B, Wang S, Hu X (2023) Biomass-derived volatiles for activation of the biochar of same origin. *Fuel* 332:126034.
 - Li C, Sun Y, Gao G, Qi L, Zhang L, Dong D, Zhang S, Hua X (2022) Influence of asphalt-derived volatiles on property of the biochar from pyrolysis of sawdust. *Fuel Process Technol* 234:107343.
 - Lin J, Cheng S (2022) Catalytic pyrolysis of crofton weed: Comparison of their pyrolysis product and preliminary economic analysis. *Environ Prog Sustain Energy* 41(2):e13742.

-
-
- Liu S, Wu G, Syed-Hassan SS, Li B, Hu X, Zhou J, Huang Y, Zhang S, Zhang H (2022) Catalytic pyrolysis of pine wood over char-supported Fe: Bio-oil upgrading and catalyst regeneration by CO₂/H₂O. *Fuel* 307:121778.
 - Liu WJ, Tian K, Jiang H, Zhang XS, Ding HS, Yu HQ (2012) Selectively improving the bio-oil quality by catalytic fast pyrolysis of heavy-metal-polluted biomass: take copper (Cu) as an example. *Environl Sci Technol* 46(14):7849-7856.
 - Loy AC, Gan DK, Yusup S, Chin BL, Lam MK, Shahbaz M, Unrean P, Acda MN, Rianawati E (2018) Thermogravimetric kinetic modelling of in-situ catalytic pyrolytic conversion of rice husk to bioenergy using rice hull ash catalyst. *Bioresour Technol* 261:213-222.
 - Luo L, Zhang Z, Li C, Nishu, He F, Zhang X, et al. (2021) Insight into master plots method for kinetic analysis of lignocellulosic biomass pyrolysis. *Energy* 233: 121194.
 - Magdziarz A, Wilk M, Wkadrzyk M (2020) Pyrolysis of hydrochar derived from biomass—experimental investigation. *Fuel* 267:117246.
 - Mahin DB (1999) *Industrial Energy and Electric Power from Wood Residues*. Arlington, VA, USA: Winrock International Institute for Agricultural Development.
 - Maia AAD, de Morais LC (2016) Kinetic parameters of red pepper waste as biomass to solid biofuel. *Bioresour Technol* 204:157–163.
 - Mallick D, Poddar MK, Mahanta P, Moholkar VS (2018) Discernment of synergism in pyrolysis of biomass blends using thermogravimetric analysis. *Bioresour Technol* 261:294.

- Maruoka H, Tomita A, Zheng L, Kimura T (2018) Mesopore connectivity improving aerosol-assisted synthesis of mesoporous alumina powders with high surface area. *Langmuir* 34:13781-13787.
- Mathanker A, Pudasainee D, Kumar A, Gupta R (2020) Hydrothermal liquefaction of lignocellulosic biomass feedstock to produce biofuels: Parametric study and products characterization. *Fuel* 271:117534.
- Meng M, Meng W, Cheng S et al. (2022) Effect of pyrolysis temperature on pyrolysis of *Camellia oleifera* shell. *Biomass Conv Bioref.*
- Menon V, Rao M (2012) Trends in bioconversion of lignocellulose: biofuels, platform chemicals & biorefinery concept. *Prog Energy Combust Sci* 38(4):522-550.
- Ministry of New and Renewable Energy (MNRE), Government of India (2022) Bio energy. <https://mnre.gov.in/bio-energy/current-status>. [Accessed on 14 Nov, 2022]
- Mishra G, Kumar J, Bhaskar T (2015) Kinetic studies on the pyrolysis of pinewood. *Bioresour Technol* 182:282-288.
- Mishra RK, Kumar V, Mohanty K (2020) Pyrolysis kinetics behaviour and thermal pyrolysis of *Samanea saman* seeds towards the production of renewable fuel. *J Energy Inst* 93(3):1148-1162.
- Mishra RK, Misra M, Mohanty AK (2022) Value-added biocarbon production through slow pyrolysis of mixed bio-oil wastes: studies on their physicochemical characteristics and structure–property–processing co-relation. *Biomass Conv Bioref.*
- Mishra RK, Mohanty K (2018) Pyrolysis kinetics and thermal behavior of waste sawdust biomass using thermogravimetric analysis. *Bioresour Technol* 251:63-74.

- Mishra RK, Mohanty K, Wang X (2020) Pyrolysis kinetic behavior and Py-GC–MS analysis of waste dahlia flowers into renewable fuel and value-added chemicals. *Fuel* 260:116338.
- Misse SE, Brillard A, Brilhac JF, Obonou M, Ayina LM, Schonnenbeck C, et al. (2018) Thermogravimetric analyses and kinetic modeling of three Cameroonian biomass. *J Therm Anal Calorim* 132:1979–1994.
- Mukherjee A, Lal R, Zimmerman AR (2014) Effects of biochar and other amendments on the physical properties and greenhouse gas emissions of an artificially degraded soil. *Sci Total Environ* 487:26–36.
- Muley PD, Henkel C, Abdollahi KK, Boldor D (2015) Pyrolysis and Catalytic Upgrading of Pinewood Sawdust Using an Induction Heating Reactor. *Energy Fuels* 29:7375–7385.
- Nam HV, Tam TT, Tho VDS (2019) Kinetic modelling of thermal decomposition of sugarcane bagasse in the inert gas environment. *Vietnam J Chem* 57(5):574–580.
- Nanda S, Mohanty P, Kozinski JA, Dalai AK (2014) Physicochemical properties of bio-oils from pyrolysis of lignocellulosic biomass with high and slow heating rate. *Energy Environ Res* 4:569–577.
- Nguyen VK, Chaudhary DK, Dahal RH, Trinh NH, Kim J, Chang SW, Hong Y, La DD, Nguyen XC, Ngo HH, Chung WJ (2021) Review on pretreatment techniques to improve anaerobic digestion of sewage sludge. *Fuel* 285:119105.
- Nishiyama Y, Sugiyama J, Chanzy H, Langan P (2003) Crystal structure and hydrogen bonding system in cellulose I α from synchrotron X-ray and neutron fiber diffraction. *J Am Chem Soc* 125(47):14300-14306.

- Owusu PA, Asumadu-Sarkodie S (2016) A review of renewable energy sources, sustainability issues and climate change mitigation. *Cogent Engineering* 3:1, 1167990.
- Ozawa T (1965) A new method of analyzing thermogravimetric data. *Bull Chem Soc Jpn* 38(11):1881-1886.
- Ozbay N, Yargic AS, Sahin RZY (2018) Tailoring Cu/Al₂O₃ catalysts for the catalytic pyrolysis of tomato waste. *J Energy Inst* 91 (2018) 424–433.
- Pappas S, Hawboldt K, Fransham P (2019) Study of selective condensation for woody biomass pyrolysis oil vapours. *Fuel* 245:233–239.
- Paramasivam B, Ramesh K, Sakthivel R (2021) Investigation and improvement on storage stability of pyrolysis oil obtained from Aegle marmelos de-oiled seed cake. *Energy Sources A: Recovery Util Environ Eff* 43(8):953-967.
- Park C, Lee H, Lee N, Ahn B, Lee J (2022) Upcycling of abandoned banner via thermocatalytic process over a MnFeCoNiCu high-entropy alloy catalyst. *J Hazard Mater* 440:129825.
- Park HJ, Dong J, Jeon J, Park Y, Yoo K, Kim S, Kim J, Kim S (2008) Effects of the operating parameters on the production of bio-oil in the fast pyrolysis of Japanese larch. *Chem Eng J* 143(1-3):124-132.
- Park HJ, Dong JI, Jeon JK, Yoo KS, Yim JH and Sohn JM (2007) Conversion of the pyrolytic vapor of radiata pine over zeolites. *J Ind Eng Chem* 13,182–189.
- Park J, Lee Y, Ryu C, Park YK (2014) Slow pyrolysis of rice straw: analysis of products properties, carbon and energy yields. *Bioresour Technol* 155:63-70.
- Peng X, Gai S, Cheng K, Yang F (2023) Hydrothermal humification mechanism of typical agricultural waste biomass: a case study of corn straw. *Green Chem* 25:1503-1512.

- Peres AP, Lunelli BH, Maciel Filho R (2013) Application of biomass to hydrogen and syngas production. *Chem Eng Trans* 32:589-594.
- Pérez-Maqueda LA, Criado JM, Gotor FJ, Málek J (2019) Advantages of combined kinetic analysis of experimental data obtained under any heating profile. *J Phys Chem* 106 (12):2862-2868.
- Pérez-Maqueda LA, Popescu C, Vyazovkin S, Burnham AK, Sbirrazzuoli N, Criado JM (2011) ICTAC Kinetics Committee recommendations for performing kinetic computations on thermal analysis data. *Thermochim Acta* 520:1–19.
- Petersson A, Thomsen MH, Hauggaard-Nielsen H, Thomsen B (2007) A-Potential bioethanol and biogas production using lignocellulosic biomass from winter rye, oilseed rape and faba bean. *Biomass Bioenerg* 31:812-819.
- Pidtasang B, Udomsap P, Sukkasi S, Chollacoop N, Pattiya A (2013) Influence of alcohol addition on properties of bio-oil produced from fast pyrolysis of eucalyptus bark in a free-fall reactor. *J Ind Eng Chem* 19(6):1851-1857.
- Population - the United Nations. [un.org](https://www.un.org). <https://www.un.org> > global-issues > population. [Accessed on 1 May 2023]
- Pradeep A, Chandrasekaran G (2006) FTIR study of Ni, Cu and Zn substituted nano-particles of MgFeO₄. *Mater Lett* 60:371–374.
- Raheem A, Qing H, Mangi FH, Areprasert C, Ding L, Yu G (2022) Roles of Heavy Metals during Pyrolysis and Gasification of Metal-Contaminated Waste Biomass: A Review. *Energ Fuel* 36 (5):2351-2368.
- Rahman MM, Chai M, Sarker M, Liu R (2020) Catalytic pyrolysis of pinewood over ZSM5 and CaO for aromatic hydrocarbon: analytical Py-GC/MS study. *J Energy Inst* 93:425–435.

-
-
- Rakesh KG, Mukul D, Parashu K, Zhengrong G, Qi HF (2015) Biochar activated by oxygen plasma for super capacitors. *J Power Sources* 274:1300–1305.
 - Rapier R (2020) Fossil fuels still supply 84 percent of the world’s energy-and other eye opener from BP’s annual review. *Forbes* <https://www.forbes.com/sites/rpapier/2020/06/20/bp-review-newhighs-in-global-energy-consumption-and-carbon-emissions-in2019/?sh=2d26a63766a1>. [Accessed 10 Apr 2021]
 - Rasool T, Srivastava VC, Khan MNS (2018) Kinetic and thermodynamic analysis of thermal decomposition of Deodar sawdust and rice husk as potential for pyrolysis. *Int J Chem React Eng* 17(1):20170184.
 - Rathore NS, Pawar A, Pawar NL (2021) Kinetic analysis and thermal degradation study on wheat straw and its biochar from vacuum pyrolysis under non-isothermal conditions. *Biomass Conv Bioref*.
 - Reed TB (1981) *Biomass Gasification: Principles and Technology*. Park Ridge, NJ: Noyes Data Corporation 154-182.
 - Rony AH, Kong L, Lu W, Dejam M, Adidharma H, Gasem KAM, Zheng Y, Norton U, Fan M (2019) Kinetics, thermodynamics, and physical characterization of corn stover (*Zea mays*) for solar biomass pyrolysis potential analysis. *Bioresour Technol* 284:466– 473.
 - Sabat G, Gouda N, Mahapatra PM, Mahakhud R, Panda AK (2022) Co-pyrolysis of beeswax with different consumer plastics for synergetic production of sustainable fuel oil. *Sustain Energy Technol Assess* 53:102493.
 - Santosa DM, Zhu C, Agblevor FA, Maddi B, Roberts BQ, Kutnyakov IV, Lee SJ, Wang H (2020) In situ catalytic fast pyrolysis using red mud catalyst: Impact of

- catalytic fast pyrolysis temperature and biomass feedstocks. *ACS Sustain Chem Eng* 8(13):5156-5164.
- Shahid A, Ishfaq M, Ahmad MS, Farooq M, Hui Z, Batawi AH, et al. (2019) Bioenergy potential of the residual microalgal biomass produced in city wastewater assessed through pyrolysis, kinetics and thermodynamics study to design algal biorefinery. *Bioresour Technol* 289:121701.
 - Shakiba, A, Aliasghar, A, Moazeni, K, Pazoki M (2023) Hydrothermal Carbonization of Sewage Sludge with Sawdust and Corn Stalk: Optimization of Process Parameters and Characterization of Hydrochar *Bioenerg Res*.
 - Shao J, Jia C, Chen X, Luo J, Chen Y, Yang J, Chen H (2019) Enhancing the production of light olefins from wheat straw with modified HZSM-5 catalytic pyrolysis. *Energy Fuel* 33:11263–11273.
 - Sharma A, Suryawanshi B, Mohanty B, Sawarkar AN (2023) Comparison of artificial neural network and response surface methodology for evaluation of the predictive capability of bio-oil yield from pyrolysis of *Mangifera indica* wood sawdust. *Fuel* 338:127251.
 - Sharma V, Hossain AK, Griffiths G, Duraisamy G, Krishnasamy A, Ravikrishnan V, Sodré JR (2022) Plastic waste to liquid fuel: A review of technologies, applications, and challenges. *Sustain Energy Technol Assess* 53:102651.
 - Shen D, Jin W, Hu J, Xiao R, Luo K (2015) An overview on fast pyrolysis of the main constituents in lignocellulosic biomass to value-added chemicals: structures, pathways and interactions. *Renew Sust Energ Rev* 51:761–774.
 - Shi Z, Ma A, Chen Y, Zhang M, Zhang Y, Zhou N, Fan S, Wang Y (2023) The Removal of Tetracycline from Aqueous Solutions Using Peanut Shell Biochars Prepared at Different Pyrolysis Temperatures. *Sustainability* 15(1):874.

-
-
- Šimon P (2004) Isoconversional methods. *J Therm Anal Calorim* 76:123.
 - Singh S, Chakraborty JP, Mondal MK (2020) Intrinsic kinetics, thermodynamic parameters and reaction mechanism of non-isothermal degradation of torrefed *Acacia nilotica* using isoconversional methods. *Fuel* 259:116263.
 - Singh SK, Nandeshwara K, Ekhe JD (2016) Thermochemical lignin depolymerization and conversion to aromatics in subcritical methanol: effects of catalytic conditions. *New J Chem* 40:3677-3685.
 - Slopiecka K, Bartocci P, Fantozzi F (2012) Thermogravimetric analysis and kinetic study of poplar wood pyrolysis. *Appl Energy* 97:491–49.
 - Soni B, Karmee SK (2020) Towards a continuous pilot scale pyrolysis based biorefinery for production of biooil and biochar from sawdust. *Fuel* 271:117570.
 - Stals M, Carleer R, Reggers G, Schreurs S, Yperman J (2010) Flash pyrolysis of heavy metal contaminated hardwoods from phytoremediation: characterization of biomass, pyrolysis oil and char/ash fraction. *J Anal Appl Pyrolysis* 89(1):22-29.
 - Starink MJ (1996) A new method for the derivation of activation energies from experiments performed at constant heating rate. *Thermochim Acta* 288:97-104.
 - Tahir MH, Çakman G, Goldfarb JL, Topcu Y, Naqvi SR, Ceylan S (2019) Demonstrating the suitability of canola residue biomass to biofuel conversion via pyrolysis through reaction kinetics, thermodynamics and evolved gas analyses. *Bioresour Technol* 279:67-73.
 - Tarek MAF, Mohamed EM, Somia BA, Matthew DH, James WL, Sandeep K (2015) Biochar from woody biomass for removing metal contaminants and carbon sequestration. *J Ind Eng Chem* 22:103–109.

- Tripathi M, Sahu JN, Ganesan P (2016) Effect of process parameters on production of biochar from biomass waste through pyrolysis: a review. *Renew Sustain Energy Rev* 55:467-481.
- U.S. Energy Information Administration (EIA), World Energy Projection System (2021), run r_210719.163829; and EIA, Annual Energy Outlook 2021, (February 2021), www.eia.gov/aeo [Accessed April 13, 2023]
- U.S. Energy Information Administration, *International Energy Outlook 2023* (IEO2023), www.eia.gov/aeo
- Ucar S, Ozkan AR (2008) Characterization of products from the pyrolysis of rapeseed oil cake. *Bioresour technol* 99(18): 8771-8776.
- Ulusal A, Apaydin VE, Bruckman VJ, Uzun BB (2021) Opportunity for sustainable biomass valorization to produce biochar for improving soil characteristics. *Biomass Conv Bioref* 11:1041–1051.
- Uzun BB, Kanmaz G (2013) Effect of operating parameters on bio-fuel production from waste furniture sawdust. *Waste Manag. Res.* 31(4):361-367.
- Valizadeh S, Jang SH, Rhee GH, Lee J, Show PL, Khan MA, Jeon BH, Lin KY, Ko CH, Chen WH, Park YK (2022) Biohydrogen production from furniture waste via catalytic gasification in air over Ni-loaded Ultra-stable Y-type zeolite. *Chem Eng J* 433(1):133793.
- Varma, AK, Mondal P (2017) Pyrolysis of sugarcane bagasse in semi batch reactor: effects of process parameters on product yields and characterization of products. *Ind Crops Prod* 95:704-717.
- Varma, AK, Thakur LS, Shankar R, Mondal P (2019) Pyrolysis of wood sawdust: Effects of process parameters on products yield and characterization of products. *Waste Manage* 89, 224-235.

-
-
- Vyazovkin S, Burnham AK, Criado JM, Pérez-Maqueda LA, Popescu C, Sbirrazzuoli N (2011) ICTAC Kinetics Committee recommendations for performing kinetic computations on thermal analysis data. *Thermochim Acta* 520(1-2):1–19.
 - Wang L, Lei H, Liu J, Bu Q (2018a) Thermal decomposition behavior and kinetics for pyrolysis and catalytic pyrolysis of Douglas fir. *RSC Adv* 8(4):2196-2202.
 - Wang Q, Wang C, Huang Y, Ding M, Wang J, Yang J (2021) Pyrolysis chemistry of n-propylcyclohexane via experimental and modeling approaches. *Fuel* 283:118847.
 - Wang T, Meng D, Zhu J, Chen X (2020) Effects of pelletizing conditions on the structure of rice straw-pellet pyrolysis char. *Fuel* 264:116909.
 - Wang W, Li X, Ye D, Cai L, Shi SQ (2018b) Catalytic pyrolysis of larch sawdust for phenol-rich bio-oil using different catalysts. *Renew Energ* 121:146-152.
 - Wang Y, Huang L, Zhang T, Wang Q (2022) Hydrogen-rich syngas production from biomass pyrolysis and catalytic reforming using biochar-based catalysts. *Fuel* 313:123006.
 - Wu W, Mei Y, Zhang L, Liu R, Cai J (2015) Kinetics and reaction chemistry of pyrolysis and combustion of tobacco waste. *Fuel* 156:71–80.
 - Xu F, Ming X, Ru J, Zhao M, Wang B, Qiao Y, Tianbe Y, (2020) Effects of operating parameters on products yield and volatiles composition during fast pyrolysis of food waste in the presence of hydrogen. *Fuel Process Technol* 210:106558.
 - Xu R, Yan C, Liu Q, Liu E, Zhang H, Zhang X, Yuan X, Han L, Lei H, Ruan R, Zhang R (2022) Development of metal-doping mesoporous biochar catalyst for

- co-valorizing biomass and plastic waste into valuable hydrocarbons, syngas, and carbons. *Fuel Process Technol* 227: 107127.
- Xu Y, Bai T, Li Q, Yang H, Yan Y, Sarkar B, Lam SS, Bolang N (2021) Influence of pyrolysis temperature on the characteristics and lead (II) adsorption capacity of phosphorus-engineered poplar sawdust biochar. *J Anal Appl Pyrol* 154:105010.
 - Yang H, Yan R, Chen H, Lee DH, Cheng C (2007) Characteristics of hemicellulose, cellulose and lignin pyrolysis. *Fuel* 86(12–13):1781–1788.
 - Yang W, Kim KH, Lee J (2022) Upcycling of decommissioned wind turbine blades through pyrolysis: A review. *J Clean Prod* 376:134292.
 - Yang Y, Li T, Jin S, Lin Y, Yang H (2011) Catalytic pyrolysis of tobacco robb: kinetic study and fuel gas produced. *Bioresour Technol* 102:11027-11033.
 - Yao Z, Reinmüller M, Ortuño N, Zhou H, Jin M, Liu J, Luque R (2023) Thermochemical conversion of waste printed circuit boards: Thermal behavior, reaction kinetics, pollutant evolution and corresponding controlling strategies. *Prog Energy Combust Sci* 97:101086.
 - Yasmin T, Asghar A, Ahmad MS, Mehmood MA, Nawaz M (2021) Biorefinery potential of *Typha domingensis* biomass to produce bioenergy and biochemicals assessed through pyrolysis, thermogravimetry, and TG-FTIR-GCMS-based study. *Biomass Conv Bioref*.
 - Yildiz G, Ronsse F, Duren R, Prins W (2016) Challenges in the design and operation of processes for catalytic fast pyrolysis of woody biomass. *Renew Sust Energ Rev* 57:1596-1610.
 - Yogalakshmi KN, Sivashanmugam P, Kavitha S, Kannah Y, Varjani S, AdishKumar S, Kumar G (2022) Lignocellulosic biomass-based pyrolysis: A comprehensive review. *Chemosphere* 286:131824.

- Yorgun S, Yildiz D (2015) Slow pyrolysis of paulownias wood: effects of pyrolysis parameters on product yield and bio-oil characterization. *J Anal Appl Pyrol* 114:68–78.
- Yuan X, He T, Cao H, Yuan Q (2017) Cattle manure pyrolysis process: kinetic and thermodynamic analysis with iso-conversional methods. *Renew Energy* 2017; 107:489–496.
- Zeng C, Jiang Y, Xu R, Han L, Zhang X (2022) Phenols-enriched biofuel and H₂-rich gas from catalytic fast pyrolysis/gasification of agricultural biomass over a novel heavy metals-containing livestock manure biochar catalyst. *J Anal Appl Pyrolysis* 167:105680.
- Zhang B, Yang B, Wu S, Guo W, Zhang J, Wu Z, Wang Z, Lim CJ (2021) Effect of torrefaction pretreatment on the fast pyrolysis behavior of biomass: Product distribution and kinetic analysis on spruce-pin-fir sawdust. *J Anal Appl Pyrol* 158:105259.
- Zhang M, He T, Jin B (2023) Effect of mineral additives on pyrolytic characteristics and heavy metal behavior during co-pyrolysis of industrial sludge and hyperaccumulator plant. *J Anal Appl Pyrolysis* 169:105827.
- Zhao N, Li BX (2016) The effect of sodium chloride on the pyrolysis of rice husk. *Appl Energy* 178:346-352.
- Zheng C, Li D, Ek M (2019) Mechanism and kinetics of thermal degradation of insulating materials developed from cellulose fiber and fire retardants. *J Therm Anal Calorim* 135:3015–3027.
- Zheng JL, Kong YP (2010) Spray combustion properties of fast pyrolysis bio-oil produced from rice husk. *Energy Convers Manag* 51(1):182-188.

- Zheng Y, Wang Y, Li D, Liu C, Lu Y, Lin X, Zheng Z (2021) Activity and selectivity of Ni–Cu bimetallic zeolites catalysts on biomass conversion for bio-aromatic and bio-phenols. *J Energy Inst* 97:58-72.
- Zhu Y, Xu G, Song W, Zhao Y, Miao Z, Yao R, Gao J (2021) Catalytic microwave pyrolysis of orange peel: Effects of acid and base catalysts mixture on products distribution. *J Energy Inst* 98:172-178.

List of publications and conferences

Publications

Research articles

- **Nidhi Agnihotri, Monoj Kumar Mondal.** "Comparison of non-catalytic and in-situ catalytic pyrolysis of *Melia azedarach* sawdust." **Journal of Analytical and Applied Pyrolysis** 172 (2023): 106006. <https://doi.org/10.1016/j.jaap.2023.106006> (Impact Factor 6.437)
- **Nidhi Agnihotri, Monoj Kumar Mondal.** "Process parameter variation of *Melia azedarach* sawdust pyrolysis for fuel properties, physicochemical characterization, and in-depth speciation analysis." **Biomass Conversion and Biorefinery** (2023): 1-15. <https://doi.org/10.1007/s13399-023-04305-7> (Impact Factor 4.103)
- **Nidhi Agnihotri, Goutam Kishore Gupta, Monoj Kumar Mondal.** "Thermokinetic analysis, thermodynamic parameters and comprehensive pyrolysis index of *Melia azedarach* sawdust as a genesis of bioenergy." **Biomass Conversion and Biorefinery** (2022): 1-18. <https://doi.org/10.1007/s13399-022-02524-y> (Impact Factor 4.103)
- **Nidhi Agnihotri, Monoj Kumar Mondal.** "Thermal analysis, kinetic behavior, reaction modeling, and comprehensive pyrolysis index of soybean stalk pyrolysis." **Biomass Conversion and Biorefinery** (2023): 1-16. <https://doi.org/10.1007/s13399-023-03807-8> (Impact Factor 4.103)

Book chapter

Nidhi Agnihotri, Monoj Kumar Mondal. "Catalytic pyrolysis for upgrading of biooil obtained from biomass." *Biofuels and Bioenergy*, **Elsevier** (2022) 495-509.

<https://doi.org/10.1016/B978-0-323-90040-9.00018-7>

International conferences

- **Nidhi Agnihotri**, Monoj Kumar Mondal. “Thermal degradation characteristics, thermo-kinetic analysis and reaction modelling of Ficus virens sawdust (FVS) for evaluation of its bioenergy generation potential” - “Chemical Engineering: Enabling Transition Towards Sustainable Future (ChemTSF-2022)” – Organized by the Department of Chemical, Engineering, IIT Roorkee.
- **Nidhi Agnihotri**, Monoj Kumar Mondal. “White fig sawdust as a genesis of bio-energy via pyrolysis, an elaborated study elucidating thermal degradation characteristics and thermo-kinetic analysis” - “Advances in Biopolymers and Composites: Health, Environment, and Energy (ABC-HEE, 2022)” – Organized by MNNIT Allahabad, Prayagraj.
- **Nidhi Agnihotri**, Monoj Kumar Mondal. “Finger millet straw pyrolysis: Physicochemical characterization, influence of process parameters on products and speciation analysis” - “Advances in Smart Materials, Chemical and Biochemical Engineering (CHEMSMART-2022)” – Organized by NIT, Rourkela.
- **Nidhi Agnihotri**, Monoj Kumar Mondal. “Influence of process parameters on pyrolytic product distribution of Ficus virens Sawdust and comprehensive characterization of its products” - CHEMCON 2022, Chemical Engineering Congress, 75th Annual Session of Indian Institute of Chemical Engineers – Organized by HBTU, Kanpur.
- **Nidhi Agnihotri**, Monoj Kumar Mondal. “Pyrolysis kinetics, thermodynamics and reaction modelling of pearl millet cob using TG/DTG analysis” – “CHEM-TECHNOVA 2023”, - Organized by HBTU, Kanpur.