LIST OF PUBLICATIONS

Journal

1. D. Sut, **N. Bhuyan**, & R. Kataki (2024) A cascaded approach for optimal utilization of *Magnolia champaca* seeds for biofuel and by-products, *Biomass Conversion and Biorefinery, https://doi.org/10.1007/s13399-024-05846-1*. (accepted on 06/06/2024)
2. **N. Bhuyan**, N. Bora, K. Boruah, N. D. Choudhury, N. Saikia, and R. Kataki (2024). Effect of Co and Ni impregnated ZSM-5 catalyst on pyrolysis products of *Tithonia diversifolia*: Kinetic study and thermodynamics. *Process Safety and Environmental Protection*, 185, 807-816.
3. M. Athparia, N. Bora, A. Deka, P. Sohtun, P. Padhi, **N. Bhuyan**, N. J. Bordoloi, L Gogoi, and R. Kataki (2023). Non-fuel applications of bio-oil for sustainability in management of bioresources. *Environmental Science and Pollution Research*, 1-25.
4. **N. Bhuyan**, N.D. Choudhury, B. K. Dutta, K. Upadhyaya, N. Saikia, and R. Kataki (2023). Assessment of kinetic parameters, mechanisms and thermodynamics of *Tithonia diversifolia* pyrolysis. *Biomass Conversion and Biorefinery*, 13, 2703–2718.
5. **N. Bhuyan**, R. Narzari, S.M. Bujarbaruah and R. Kataki (2022) Comparative assessment of artificial neural network and response surface methodology for evaluation of the predictive capability on bio-oil yield of *Tithonia diversifolia* pyrolysis, *Biomass Conversion and Biorefinery*, 12, 2203–2218.
6. N. D. Choudhury, **N. Bhuyan**, N. Bordoloi, N. Saikia, and R. Kataki (2021). Production of bio-oil from coir pith via pyrolysis: kinetics, thermodynamics, and optimization using response surface methodology. *Biomass Conversion and Biorefinery*, 11, 2881–2898.
7. U. Deb, **N. Bhuyan**, S.S. Bhattacharya, and R. Kataki, (2019). Characterization of agro-waste and weed biomass to assess their potential for bioenergy production. *International Journal of Renewable Energy Development*, 8(3): 243-251.
8. M. J. Borah, H. J. Sarmah, **N. Bhuyan**, D. Mohanta, and D. Deka, (2022). Application of Box-Behnken design in optimization of biodiesel yield using WO_3/graphene quantum dot (GQD) system and its kinetics analysis. *Biomass Conversion and Biorefinery*, 12, 221–232.

9. M. J. Borah, A. Das, V. Das, **N. Bhuyan**, and D. Deka (2019). Transesterification of waste cooking oil for biodiesel production catalyzed by Zn substituted waste egg shell derived CaO nanocatalyst, *Fuel,* 242: 345-354.

10. K. Konwar, H.P. Nath, **N. Bhuyan,** B.K. Saikia, R.C. Borah, A. C. Kalita, and N. Saikia (2019). Effect of biomass addition on the devolatilization kinetics, mechanisms and thermodynamics of a northeast Indian low-rank sub-bituminous coal. *Fuel*, 256, 115926.
11. V. Basumatary, R. Saikia, R. Narzari, N. Bordoloi, L. Gogoi, D. Sut, **N. Bhuyan** and R. Kataki (2018). Tea factory waste as a feedstock for thermo-chemical conversion to biofuel and biomaterial, *Materials Today Proceedings*, 5(11): 23413-23422.
12. S. Chutia, R. Narzari, N. Bordoloi, R. Saikia, L. Gogoi, D. Sut, **N. Bhuyan** and R. Kataki (2018). Pyrolysis of dried black liquor solids and characterization of the bio-char and bio-oil. *Materials Today Proceedings*, 5(11): 23193-23202.

Book Chapter

1. **N. Bhuyan**, M.J. Borah, N. Bora, D. Saikia, D. Deka, & R. Kataki (2021). Heterogeneous Nanocatalytic Conversion of Waste to Biodiesel. *Nano-and Biocatalysts for Biodiesel Production* (Ed. A. P. Ingle) Wiley Scrivener Publishing.
2. **N. Bhuyan**, N. Bora, R. Narzari, K. Boruah, & R. Kataki (2021). Thermo-Catalytic Conversion of Non-Edible Seeds (Extractive-Rich Biomass) to Fuel Oil. *Liquid Biofuels: Fundamentals, Characterization, and Applications* (Ed. K.P. Shadangi) Wiley Scrivener Publishing, 285. ISBN: 9781119793014.
3. **N. Bhuyan**, A. Dutta, R. Mohan, N. Bora, & R. Kataki, Advances in Nanotechnology for Biofuel Production. In *Nanomaterials: Application in Biofuels and Bioenergy Production Systems* (Ed. R. Praveen Kumar, B. Bharathiraja). Academic Press (Elsevier), 2021, pp. 533-562. ISBN: 9780128224014.
4. **N. Bhuyan**, R. Narzari, L. Gogoi, N. Bordoloi, D.R. Palsaniya, U. Deb, N. Gogoi, and R. Kataki, Valorization of Agricultural Wastes for Multidimensional Use. In: *Sustainable*

Bioresources for Emerging Bioeconomy (Eds. Kataki, R., Pandey, A., Pant, D., and Khanal, S.), Elsevier, 2020.

5. **N. Bhuyan,** D. Sut, L. Gogoi, V.V. Goud, and R. Kataki, Rural Bio-refinery: A Viable Solution for Production of Fuel and Chemicals in Rural India, In: *Sustainable Bioenergy*, (Eds. M. Rai and A. P. Ingle), Elsevier, 2019, pp. 21-47 (ISBN 9780128176542).
6. N.D. Choudhury, **N. Bhuyan**, R. Narzari, R. Saikia, D. Seth, N. Saha, & R. Kataki (2021) Various conversion techniques for the recovery of value-added products from tea waste. *Valorization of Agri-Food Wastes and By-Products* (Ed. R. Bhat), Elsevier 237-265 eBook ISBN: 9780128242605 Paperback ISBN: 9780128240441
7. M. Hiloidhari, **N. Bhuyan**, N. Gogoi, D. Seth, A. Singh, S. Prasad, A. Garg, and R. Kataki, AgroIndustry Wastes: Feedstocks for Biofuels and Biomaterials for Sustainable Rural Development. In: *Refining Biomass Residues for Sustainable Energy and Bioproducts* (Eds. Praveen Kumar, R., Gnansounou, E., Kenthorai Raman, J., and Baskar, G), Elsevier, 2020, pp. 357-388 (ISBN: 9780128189962).
8. S. Gogoi, **N. Bhuyan**, D. Sut, R. Narzari, L. Gogoi, and R. Kataki, Agricultural Wastes as Feedstock for Thermo-Chemical Conversion: Products Distribution and Characterization. In: *Energy Recovery Processes from Wastes*, (Ed. Ghosh, S.K.), Springer, 2019, pp. 115-128 (ISBN: 978-981-32-9227-7).
9. N. Bora, R. Narzari, **N. Bhuyan**, and R. Kataki (2020). Bioenergy-Byproducts Based Electrodes for Flexible Supercapacitors. In *Biorefineries: A Step Towards Renewable and Clean Energy* (Ed. P. Verma). Springer, Singapore, 2020, pp. 437-464, ISBN: 9789811595936.
10. P. Deka, M. Gohain, **N. Bhuyan**, N. Gogoi, and R. Kataki (2022). Utilization of Biowastes in Green Chemistry. In: *Climate Change and Agriculture: Perspectives, Sustainability and Resilience* (Ed. N. Benkeblia) Wiley, pp. 399-425. Print ISBN:9781119789758, Online ISBN:9781119789789
11. S. Das, A.S. Reshad, **N. Bhuyan**, D. Sut, P. Tiwari, V.V. Goud, and R. Kataki, Utilization of Nonedible Oilseeds in a Biorefinery Approach with Special Emphasis on Rubber Seeds. In: *Waste Biorefinery* (Eds. Bhaskar, T., Pandey, A., Rene, E.R., and Tsang, D.), Elsevier, 2020, pp. 311-336.

12. S. Gogoi, R. Narzari, N. Bordoloi, **N. Bhuyan**, D. Sut, L. Gogoi, and R. Kataki, Influence of Temperature on Quality and Yield of Pyrolytic Products of Biofuel Process Wastes. In: *Energy Recovery Processes from Wastes*, (Ed. Ghosh, S.K.), Springer, 2019, pp. 129-142 (ISBN: 978-981-32-9227-7).
13. M.M. Phukan, R. Kumar, K. Gupta, P. Bardhan, **N. Bhuyan**, L. Gogoi, ... and R. Kataki (2021). Aquatic Microbial Oxygenic Phototrophs: A Short Treatise on Diverse Applications and the Future Biofuel Scenario. In *Environmental Microbiology and Biotechnology* (Eds. A. Singh, S. Srivastava, D. Rathore, D. Pant). Springer, Singapore, pp. 135-152.
14. R. Kataki, N. Bordoloi, R. Saikia, D. Sut, R. Narzari, L. Gogoi, and **N. Bhuyan**, Wastes Valorization to Fuel and Chemicals through Pyrolysis: Technology, Feedstock, Products, and Economic Analysis. In: *Waste to Wealth* (Eds. Singhania, R.R., Agarwal, A., Sukumaran, R.K. and Praveen Kumar, R.), Springer, 2018, pp. 477-514 (ISBN 978-981-10-7431-8).

Conferences, seminars attended and poster presented

1) **N. Bhuyan,** N. Dev Choudhury, K. Upadhyaya, and R. Kataki presented a paper entitled "**Assessment of kinetic parameters of *Tithonia diversifolia* pyrolysis"** in 3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020), organized by Assam Science and Technology University (ASTU), 17th-19th August, 2020.

2) **N. Bhuyan,** R. Narzari and R. Kataki presented a paper entitled "**Comparative assessment of artificial neural network and response surface methodology for evaluation of the predictive capability on bio-oil yield of *Tithonia diversifolia* pyrolysis**" in International Conference on New Horizons in Biotechnology (NHBT 2019), jointly organized by CSIR-NIIST and BRSI at Thiruvananthapuram, Kerala, India, 20-24th Nov, 2019.

3) **N. Bhuyan** and R. Kataki presented a paper entitled **"Characterization of carbonaceous product obtained by pyrolysis and hydrothermal carbonization of *Pistia stratiotes"*** in International Conference on Renewable and Alternate Energy (ICRAE- 2018), organized by ASTU, Guwahati, Assam, 4th-6th Dec, 2018.

4) **N. Bhuyan**, N. Saikia, R. Kataki presented a paper entitled **"Thermo-kinetic evaluation of *Messua ferrea*"** in National Conference on Renewable Energy Technology: Utilization for Rural Development (ncreturd2017) in NEHU, Shillong, February 27-March 1, 2017.

Appendices

Table S1: Effect of temperature on product distribution

Temperature (°C)	Bio-oil (wt.%)	Biochar (wt.%)	Gas (wt.%)
400	17.65±0.09	46.25±0.05	36.09±0.14
450	20.27±0.04	43.45±0.02	36.28±0.03
500	24.64±0.06	38.4±0.05	36.96±0.11
550	22.72±0.10	36.21±0.02	41.07±0.12
600	22.4±0.11	34.15±0.20	43.45±0.31

Table S2: Effect of heating rate on product distribution

Heating Rate (°C/min)	Bio-oil (wt. %)	Biochar (wt. %)	Gas (wt. %)
10	24.64±0.06	38.4±0.05	36.96±0.11
20	24.83±0.03	36.32±0.07	38.85±0.04
30	26.14±0.04	33.99±0.16	39.86±0.19
40	27.28±0.20	31.55±0.12	41.16±0.12

Table S3: Effect of particle size on product distribution

Particle Size (mm)	Bio-oil (wt. %)	Biochar (wt. %)	Gas (wt. %)
<0.25	27.28±0.2	31.55±0.12	41.16±0.12
0.25-0.5	27.63±0.05	34.15±0.11	38.22±0.12
0.5-0.84	26.90±0.06	37.05±0.08	36.45±0.12
>0.84	24.99±0.10	40±0.04	35±0.06

Table S4: Effect of nitrogen flow rate on product distribution

Flow rate (ml/min)	Bio-oil (wt. %)	Biochar (wt. %)	Gas (wt. %)
50	27.63±0.05	34.15±0.11	38.22±0.12
100	29.28±0.17	32.05±0.04	38.67±0.12
150	30.16±0.09	30.98±0.08	38.86±0.18
200	29.56±0.40	30.43±0.07	40.01±0.35

Table S5: GC-MS compounds for pyrolysis oil obtained using HZSM-5 catalyst

RT	Compounds name	Molecular formula	Area %	Classification
8.439	1-TERT-BUTOXY-2-ETHOXYETHANE	C8H18O2	2.249	Aliphatic ether
9.329	1,1-DIMETHOXYCYCLOPENTANE	C7H14O2	0.616	Aliphatic ether
9.639	FURAN, 3-METHYL-	C5H6O	0.84	Furan
11.215	CYCLOHEXANE, METHYLENE-	C7H12	0.614	Cyclo alkane
11.685	1,1'-BICYCLOOCTYL	C16H30	4.065	Bi-cyclo hydrocarbon
13.125	BENZENE, (1,1-DIMETHYLETHOXY)-	C10H14O	2.059	Aromatic ether
13.426	CYCLOHEXENE, 1-METHYL-	C7H12	1.654	Cyclic Hydrocarbon
13.726	3-TETRADECYNE	C14H26	1.25	Acyclic hydrocarbon
14.161	PENTANE, 1,1'-OXYBIS-	C10H22O	1.075	Aliphatic ether
14.651	2,4-PENTADIENOIC ACID, 3,4-DIMETHYL-, ISOPROPYL ESTER	C10H16O2	1.113	Ester
14.936	2-PENTENE, 3-ETHYL-2-METHYL-	C8H16	1.422	Aliphatic hydrocarbon
15.261	3-TETRADECYNE	C14H26	0.858	Aliphatic hydrocarbon
16.697	PHENOL, 2-METHOXY-	C7H8O2	4.796	Methoxy Phenol
17.517	CYCLOHEXANE, 1,2,3-TRIMETHYL-	C9H18	0.864	Cyclic aliphatic hydrocarbon
19.513	PHENOL, 2-METHOXY-4-METHYL-	C8H10O2	1.514	Methoxy,Methyl substituted Phenol
21.819	PHENOL, 4-ETHYL-2-METHOXY-	C9H12O2	1.805	Ethyl, Methoxy substituted Phenol
23.234	2-METHOXY-4-VINYLPHENOL	C9H10O2	2.3	Methoxy. Vinyl substituted Phenol
24.105	PHENOL, 2-METHOXY-4-(1-PROPENYL)-	C10H12O2	0.548	Methoxy, propenyl substituted Phenol
25.075	PHENOL, 2,6-DIMETHOXY-	C8H10O3	6.582	Aromatic Phenol
25.28	PHENOL, 2,6-DIMETHOXY-	C8H10O3	0.636	Aromatic Phenol
26.736	EUGENOL	C10H12O2	2.475	Propenyl, Methoxy Substituted Phenol
27.196	1,2,3-TRIMETHOXYBENZENE	C9H12O3	2.015	Aromatic ether
28.952	BENZENE, 1-METHYL-3-(PHENYLMETHYL)-	C14H14	3.071	Benzyl benzene
29.952	PHENOL, 2-METHOXY-4-PROPYL-	C10H14O2	0.668	Methoxy, propyl substituted Phenol
30.257	4-METHYL-2,5-DIMETHOXYBENZALDEHYDE	C10H12O3	1.974	Aromatic aldehyde
30.868	BENZENE,1,4-DIMETHOXY-2,3,5,6-TETRAMETHYL-	C12H18O2	0.478	Aromatic ether
32.163	BENZENE, 2-(1,1-DIMETHYLETHYL)-1,4-DIMETHOXY	C12H18O2	0.539	Aromatic ether

33.243	BENZENE,2-(1,1-DIMETHYLETHYL)-1,4-DIMETHOXY-	$C_{12}H_{18}O_2$	2.408	Aromatic ether
35.754	1H-PYRROLE-2-CARBOXYLIC ACID, 5-ETHYL-, ETHYL ESTER	$C_9H_{13}O_2N$	0.732	Ester

Table S6: GC-MS compounds for pyrolysis oil obtained using Co/ZSM-5 catalyst

RT	Compounds name	Molecular formula	Area %	Class
8.434	1-TERT-BUTOXY-2-ETHOXYETHANE	C8H18O2	3.132	Aliphatic Ether
9.649	2-CYCLOPENTEN-1-ONE	C5H6O	0.708	Cyclic Ketone
11.215	1-ETHYLCYCLOPENTENE	C7H12	0.592	Cyclic hydrocarbon
11.685	1,1'-BICYCLOOCTYL	C16H30	3.459	Bi-cyclo hydrocarbon
13.15	PHENOL	C6H6O	0.77	Phenol
13.426	CYCLOHEXENE, 1-METHYL-	C7H12	0.629	Cyclic hydrocarbon
14.176	1-METHYLCYCLOHEXANOL	C7 H14O	0.82	Cyclic alcohol
14.656	4-METHOXYPYRIDINE-N-OXIDE	C6H7O2N	0.836	Pyridine
14.946	CYCLOHEXANE, 1,2-DIMETHYL	C8H16	0.87	Cyclic hydrocarbon
15.266	ETHYLIDENECYCLOOCTANE	C10H18	0.617	Cyclic hydrocarbon
15.962	PHENOL, 4-METHYL-	C7H8O	0.508	Phenol
16.707	PHENOL, 2-METHOXY-	C7H8O2	3.605	Methoxy Phenol
17.522	CYCLOHEXANE, 1,2,3-TRIMETHYL-	C9H18	0.649	Methyl substituted Cyclic hydrocarbon
19.513	2-CYCLOPENTEN-1-ONE, 2,3,4,5-TETRAMETHYL-	C9H14O	1.09	Cyclic Ketone
23.089	5-(HYDROXYMETHYL)-2-(DIMETHOXYMETHYL)FURAN	C8H12O4	0.59	Furan
23.245	PHENOL, 2,3,5,6-TETRAMETHYL-	C10H14O	1.807	Phenol
25.08	PHENOL, 2,6-DIMETHOXY-	C8H10O3	6.579	Phenol
25.3	BENZENE, 2-ETHOXY-1,3-DIMETHOXY-	C10H14O3	0.574	Aromatic ether
26.736	EUGENOL	C10H12O2	1.956	Phenol
27.201	1,2,3-TRIMETHOXYBENZENE	C9H12O3	2.095	Aromatic ether
28.957	BENZENE, 1,2,3-TRIMETHOXY-5-METHYL-	C10H14O3	3.488	Aromatic ether
29.952	PHENOL, 2-METHOXY-4-PROPYL-	C10H14O2	0.903	Phenol
30.267	3',5'-DIMETHOXYACETOPHENONE	C10H12O3	1.752	Aromatic Ketone
30.713	BENZENE, 1-ETHYL-3-(PHENYLMETHYL)-	C15H16	0.559	Benzyl benzene
30.868	BENZENE,1,4-DIMETHOXY-2,3,5,6-TETRAMETHYL-	C12H18O2	0.782	Aromatic ether
33.249	PHENOL, 2,6-DIMETHOXY-4-(2-PROPENYL)-	C11H14O3	2.43	Phenol
34.969	1,1'-BIPHENYL, 4-(1-METHYLETHYL)-	C15H16	0.503	Phenyl benzene
35.76	BENZENE, 1,1'-BUTYLIDENEBIS-	C16H18	1.221	Benzyl benzene

Table S7: GC-MS compounds for pyrolysis oil obtained using Ni/ZSM-5 catalyst

RT	Compounds name	Molecular formula	Area %	Class
8.439	1-TERT-BUTOXY-2-ETHOXYETHANE	C8H18O2	2.358	Ether
9.324	CYCLOHEXENE, 1-ISOPENTYL-	C11H20	0.617	Alkyle substituted cyclic hydrocarbon
9.639	FURAN, 3-METHYL-	C5H6O	1.149	Methyl Furan
11.215	1-ETHYLCYCLOPENTENE	C7H12	0.662	Cyclic hydrocarbon
11.675	CYCLOPENTANE,1,1,3-TRIMETHYL-3-(2-METHYL-2-PROPENY	C12H22	3.022	Alkyle substituted cyclic hydrocarbon
13.13	PHENOL	C6H6O	2.176	Phenol
13.421	CYCLOHEXENE, 3-METHYL-	C7H12	0.859	Methyl substituted cyclic hydrocarbon
13.721	4-HEPTEN-3-OL, 4-METHYL-	C8H16O	0.501	Cyclic aliphatic Alcohol
14.161	PENTANE, 1,1'-OXYBIS-	C10H22O	1.156	Acyclic ether
14.931	3-HEXENE, 3,4-DIMETHYL-	C8H16	1.629	Methyl substituted cyclic hydrocarbon
15.256	CYCLOOCTANE, ETHENYL-	C10H18	1.062	Vinyl substituted cyclic hydrocarbon
16.697	PHENOL, 2-METHOXY-	C7H8O2	4.278	Methoxy Phenol
17.507	CYCLOHEXANE, 1,2,3-TRIMETHYL-	C9H18	0.832	Methyl substituted cyclic hydrocarbon
18.863	HEXANE, 2,2,5,5-TETRAMETHYL-	C10H22	0.702	Methyl substituted cyclic hydrocarbon
19.503	2-CYCLOPENTEN-1-ONE, 2,3,4,5-TETRAMETHYL-	C9H14O	1.118	Cyclic Ketone
21.814	PHENOL, 4-ETHYL-2-METHOXY-	C9H12O2	1.363	Ethyl, methoxy substituted Phenol
23.239	PHENOL, M-TERT-BUTYL-	C10H14O	1.4	Alkyl substituted Phenol
25.07	PHENOL, 2,6-DIMETHOXY-	C8H10O3	6.744	Methoxy substituted Phenol
25.45	PHENOL, 3,4-DIMETHOXY-	C8H10O3	0.626	Methoxy substituted Phenol
25.63	2-CYCLOPENTEN-1-ONE, 3-METHYL-2-(2-PENTENYL)-, (Z)	C11H16O	0.63	Cyclic Ketone
26.731	PHENOL, 2-METHOXY-4-(1-PROPENYL)-	C10H12O2	1.142	Methoxy, Propenyl substituted Phenol
28.947	BENZENE, 1,2,3-TRIMETHOXY-5-METHYL-	C10H14O3	2.461	Methyl substituted Aromatic ether
29.957	PHENOL, 2-METHOXY-4-PROPYL-	C10H14O2	0.74	Methoxy, propyl substituted phenol
30.247	PHENOL, 3-(1,1-DIMETHYLETHYL)-4-METHOXY-	C11H16O2	0.969	Methoxy, alkyl Phenol
30.867	PHENOL, 2,6-DIMETHOXY-4-(2-PROPENYL)-	C11H14O3	0.552	Methoxy, propenyl Phenol
33.243	BENZENE,2-(1,1-DIMETHYLETHYL)-1,4-DIMETHOXY-	C12H18O2	1.06	Alkyl substituted Aromatic ether
35.764	BENZENE, 1,1'-BUTYLIDENEBIS-	C16H18	0.95	Benzyl benzene