

Pankaj Kumar

Assistant Professor

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Educational qualifications

PhD, Chemical Engineering, IIT Hyderabad, July 2019

M. Tech, Chemical Engineering, IIT Hyderabad, July 2012

B. Tech, Chemical Engineering, Nagpur University, June 2010

Research interest/Hands on Experience

Biofuels, Biorefinery, Heterogeneous catalysis, Reaction engineering, Petroleum Refining Processes, Process design & Techno-economic analysis using ASPEN Plus.

Sponsored project

- **Title:** Production of fuels and aromatics from lignocellulosic biomass: an integrated bio- refinery approach.
- **Funding Agency:** DBT, Govt. of India
- **Approval Amount (Rs.):** 2963360/-
- **Role:** PI

Work Experience

Assistant Professor	January 2023- till date	School of Studies of Engineering & Technology, GGV (A Central University), Bilaspur.
Assistant Professor	July 2019 – Dec. 2022	BITS-Pilani, Hyderabad Campus
Research Associate	Nov. 2014 - Nov. 2016	Hindustan Petroleum Green R & D Centre, Bangalore

Research Activities

BITS Pilani Hyderabad Campus (July 2019-Dec. 2022)

Biomass to fuels and chemicals

- Design of stable and regenerable catalyst for depolymerization of lignin to value added hydrocarbons.
- Conceptual process design and economic analysis for fuels and chemicals from lignocellulose biomass using ASPEN PLUS software.

Publications with BITS affiliation

- 4 research articles published in international journals.
- 4 book chapters published.

Research scholar (During Ph.D), IIT Hyderabad (**2013-2019**)

The supported Ni, NiMo, Co, and CoMo catalysts were prepared by incipient wetness impregnation method. The physicochemical characteristics of these catalysts were evaluated by various techniques such as BET, TPR, NH₃-TPD, H₂-pulse chemisorption, powder XRD, Raman and UV-Vis-NIR spectroscopy to identify the catalytically active species to correlate their role in the catalytic performance. The HDO of stearic acid was

conducted in a high-pressure batch reactor using n-dodecane as the solvent. The products of the liquid sample were identified by GC-MS and quantified by GC-FID. The gaseous products were analyzed by GC-TCD. A reaction mechanism was developed based on the identified products. A suitable kinetic model was also developed using the proposed reaction mechanism over different catalysts to correlate the experimental data.

Research Associate, HP Green R and D Centre (HPCL), Bangalore (**2014-2016**)

FCC Division: *Process development for production of high yield and high quality bio-oil via fast pyrolysis of biomass and upgrading bio-oil to value added hydrocarbon by FCC/Hydroprocessing.* A fluidized bed **Biomass Pyrolysis Unit** (2 kg/h capacity) designed and commissioned at HP Green R and D Centre. The fast pyrolysis of saw dust was conducted in Biomass Pyrolysis Unit. The bio-oil was characterized by various analytical techniques such as CHNSO analysis, FTIR, ¹H-NMR. Bio-oil was further co-processed with VGO by FCC in a pilot plant for production of value added hydrocarbon. The liquid products were quantified by simulated distillation system into different range of hydrocarbon.

Course Taught

Reaction Engineering, Thermodynamics (first year student), Process Design Principles, Chemical process calculation, Petroleum Refining Technology, Chemical Engineering Lab.

Award and Recognition

- Sponsored project from DBT, Govt. of India
- Teaching Assistantship (Process Simulation using ASPEN)
- Junior Research Fellowship (DST, Govt. of India)
- GATE Qualified

Publications

Journals

1. Mohan Varkolu, Sreedhar Gundekari, **Pankaj Kumar**, Dina Hajjar, Arwa A. Makki, Catalytic transfer hydrogenation of nitrobenzene through the dehydrogenation of 1,2-butanediol over Cu/SiO₂ catalyst, The Canadian Journal of Chemical Engineering, **2025**, DOI: <http://doi.org/10.1002/cjce.70082>.
2. G. P. Dewangan, S. N. Saha, R. S. Thakur, S. Meshram, **Pankaj Kumar**, Fluidization characteristics of rice husk with and without coal using a bubbling fluidized cold bed model, The Canadian Journal of Chemical Engineering, **2025**, DOI: <http://doi.org/10.1002/cjce.70081>.
3. Mohan Varkolu, Sreedhar Gundekari, Venkata Chandra Sekhar Palla, **Pankaj Kumar**, Satyajit Bhattacharjee, Thallada Vinodkumar, Recent advances in biochar production, characterization, and environmental applications, Catalysts, **2025**, 15(3), 243.
4. **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Hydrodeoxygenation of stearic acid to produce green diesel over alumina supported CoMo catalysts: Role of Co/Mo mole ratio. *Renewable Energy*, **2024**, 237, 121700.
5. Sreedhar Gundekari, Ambika Manupathi, Sampoorna Chandu, Mohan Varkolu, **Pankaj Kumar**, Sanjib Kumar Karmee, Catalytic hydroconversion of lignin-based aromatics to aviation fuels—a review. *Biomass Conversion and Biorefinery*, **2024**, <https://doi.org/10.1007/s13399-024-05895-6>.
6. Vinod Kumar, **Pankaj Kumar**, Sunil K Maity, Deepti Agrawal, Vivek Narisetty, Samuel Jacob, Gopalakrishnan Kumar, Shashi Kant Bhatia, Dinesh Kumar, Vivekanand Vivekanand, Recent advances in bio-based production of top platform chemical, succinic acid: an alternative to conventional chemistry. *Biotechnology for Biofuels and Bioproducts*, **2024**, 17(1), 72.
7. Anant Kedia, Arnab Dutta, **Pankaj Kumar***, Dimethyl Carbonate as a Cost-Effective Substitute of Methanol for Biodiesel Production via Transesterification

- of Nonedible Oil. *BioEnergy Research*, **2023**, 16, 1134-1142.
8. Anant Kedia, **Pankaj Kumar***, Arnab Dutta, Value added hydrocarbons from lignin derived bio-oils: Insights from process simulations. *Material Today-Proceedings*, **2023**, 72(1) 187-191.
 9. **Pankaj Kumar**, Sudhakara Reddy Yenumala, Sunil K. Maity, Debaprasad Shee, Kinetics of hydrodeoxygenation of stearic acid using supported nickel catalysts: Effects of supports. *Applied Catalysis A: General* **2014**, 471, 28-38.
 10. **Pankaj Kumar**, Pramod Kumar, Peddy V C Rao, Nettem V Choudary, Gandham Sriganesh, Saw dust pyrolysis: Effect of temperature and catalysts. *Fuel* **2017**, 199, 339-345.
 11. **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Role of NiMo alloy and Ni species in the performance of NiMo/alumina Catalysts for Hydrodeoxygenation of stearic acid: A Kinetic Study. *ACS Omega* **2019**, 4 (2), 2833-2843.
 12. **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Hydrodeoxygenation of stearic acid using Mo modified Ni and Co/alumina catalysts: Effect of calcination temperature. *Chemical Engineering Communications* **2020**, 207 (7), 904-919.
 13. Sudhakara Reddy Yenumala, **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Production of green diesel from karanja oil (*Pongamia pinnata*) using mesoporous NiMo-alumina composite catalysts. *Bioresource Technology Reports* **2019**, 7, 100288.
 14. Sudhakara Reddy Yenumala, **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Hydrodeoxygenation of karanja oil using ordered mesoporous nickel-alumina composite catalysts. *Catalysis Today*, **2020**, 348, 45-54.
 15. Mohan Varkolu, Alekhya Kunamalla, S A K Jinnala, **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Role of CeO₂/ZrO₂ mole ratio and nickel loading for steam reforming of n-butanol using Ni-CeO₂-ZrO₂-SiO₂ composite catalysts: A reaction mechanism. *International Journal of Hydrogen Energy*, **2021**, 46(10) 7320-7335.

Book chapter:

1. **Pankaj Kumar**, M Varkolu, S Mailaram, A Kunamalla, SK Maity, **Chapter 12 - Biorefinery Polyutilization Systems: Production of Green Transportation Fuels from Biomass**. *Polygeneration with Polystorage for Chemical and Energy Hubs*, **2019**, 373-407. **Publisher: Elsevier**. ISBN: 978-0-12-813306-4 DOI: [10.1016/B978-0-12-813306-4.00012-4](https://doi.org/10.1016/B978-0-12-813306-4.00012-4).
2. Swarnalatha Mailaram, **Pankaj Kumar**, Sunil K. Maity*, Biofuels from Triglycerides: A Review. *Triglycerides: An Overview*. Editor: Felix J. Juhl, Academic Press, Nova Science Publishers, Inc., New York **2020**, 1-27. ISBN: 978-1-53618-134-0.
3. S Mailaram, **Pankaj Kumar**, A Kunamalla, Palkesh Saklecha, SK Maity* **Chapter 3: Biomass, Biorefinery, and Biofuels**, Sustainable Fuel Technologies Handbook. Editor: Suman dutta and Chaudhery Mustansar Hussain, Academic Press, Elsevier, **2021**, 51-87. ISBN: 978-0-12-822989-7, DOI: [10.1016/B978-0-12-822989-7.00003-2](https://doi.org/10.1016/B978-0-12-822989-7.00003-2).
4. **Pankaj Kumar***, Deepak Verma, Malayil Gopalan Sibi, Paresh Butolia, Sunil K Maity **Chapter 4: Hydrodeoxygenation of triglycerides for the production of green diesel: Role of heterogeneous catalysis**, Hydrocarbon Biorefinery Sustainable Processing of Biomass for Hydrocarbon Biofuels, Editor: Sunil K. Maity, Kalyan Gayen and Tridib Kumar, Academic Press, Elsevier, **2022**, 97-126. ISBN: 978-0-12-823306-1. DOI: [10.1016/B978-0-12-823306-1.00013-3](https://doi.org/10.1016/B978-0-12-823306-1.00013-3).
5. Alekhya Kunamalla, Swarnalatha Mailaram, Bhushan S. Srirame, **Pankaj Kumar**, Sunil K. Maity, **Chapter 1 - Hydrocarbon biorefinery: A sustainable approach**,

Hydrocarbon Biorefinery Sustainable Processing of Biomass for Hydrocarbon Biofuels, Editor: Sunil K. Maity, Kalyan Gayen and Tridib Kumar, Academic Press, Elsevier, **2022**, 1-44, ISBN:978-0-12-823306-1. DOI:[10.1016/B978-0-12-823306-1.00004-2](https://doi.org/10.1016/B978-0-12-823306-1.00004-2).

Conference Presentations:

1. Anant Kedia, **Pankaj Kumar***, Arnab Dutta, Value added hydrocarbons from lignin derived bio-oils: Insights from process simulations, NMTE²A 18-19 February, BITS Pilani Hyderabad Campus, India, **2022**.
2. **Pankaj Kumar**, Sunil K. Maity, Debaprasad Shee, Hydrodeoxygenation of stearic acid over NiMo/ γ -Al₂O₃ catalyst, American Chemical Society 255th, New Orleans, LA, March 18-22, 2018.
3. **Pankaj Kumar**, S R Yenumala, Sunil K. Maity, Debaprasad Shee, Hydrodeoxygenation of Stearic Acid Using Supported Nickel Alumina Catalysts. CHEMCON, Dr. B.R. Ambedkar National Institute of Technology, Punjab, India, 27-30 December, 2012.