Busigari Rajasekhar Reddy, Ph.D.

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Assistant Professor, IIT (ISM) Dhanbad.

Fuel, Minerals and Metallurgical Engineering **Sep 2021-till now**

Research areas: Biomass Conversion, Microwave heating for Circular Economy Waste plastics conversion to lubricants and transportation fuels, Rapid Coke Making via Microwave Heating, Pyrolysis and Gasification Kinetics, Fuel Characterization and Solid Waste Management.

POSTDOCTORAL FELLOWSHIP

University of Delaware, Newark, Delaware, USA. **Jan 2020- Sep 2021**

Delaware Energy Institute (DEI),

Advisor: Prof. Dionisios G. Vlachos, Chair Prof., University of Delaware,

Director Delaware Energy Institute and Catalysis Center for Energy Innovation,

Topic: *Microwave-assisted Catalytic Conversion of Waste Plastics, and Microwave-assisted Chemical Vapor Infiltration*

EDUCATION

Program	Institution	%/CGPA	Year of completion
Ph.D.	**Indian Institute of Technology Madras, Chennai** Department of Chemical Engineering **Advisor:** Dr. R. Vinu, Associate Professor **Thesis:** *Microwave-assisted pyrolysis of coals and biomass for high-value chemicals and carbon nanomaterials*		July 2019
M.S.	**Indian Institute of Technology Madras, Chennai** Department of Chemical Engineering	8.6	July 2019
B.Tech.	**Sri Venkateswara University College of Engineering, Tirupati, A.P.** Department of Chemical Engineering	82.6	May 2014
XII	**R.E.S. Junior College, Mydukur, A.P.**	96.8	May 2010
X	**S.V. High School, Mydukur, A.P.**	91.7	May 2008

AWARDS

Institute Research Award Best Poster Award **2019**

- Recipient of Institute Research Award in recognition of the exemplary research work

M.H. Shukla Prize **2015**

- For the 2nd best technical paper presented at the annual session of IIChE 2015

Topper of the B.Tech. Class **2014**

- Stood in top 5% of the class of 40 in B.Tech. at SVUCE

Merit in S.S.C and 12th Class **2008-10**

- Stood first among all the State-level Government and aided colleges in 2010.
- Stood 2nd and 3rd position in district level talent tests in 2008.

JOURNAL PUBLICATIONS

1. Wu L, Guan Y, Reddy BR, Li C, Liew RK, Zhou J. Revelation of non-thermal effects on microwave drying of lignite: Reactor design and drying characteristics. Fuel 2025;383:133893, https://doi.org/10.1016/j.fuel.2024.133893
2. K. Kachhadiya, D. Patel, G.J. Vijaybhai, P. Raghuvanshi, D.V. Surya, S. Dharaskar, G.P. Kumar, **B.R. Reddy**, N. Remya, T.H. Kumar, T. Basak, Conversion of waste polystyrene into valuable aromatic hydrocarbons via microwave-assisted pyrolysis, *Environ. Sci. Pollut. Res*. (2023). https://doi.org/10.1007/s11356-023-28294-2.
3. Dadi VS, Veluru S, Tanneru HK, Rajasekhar Reddy B, Potnuri R, Kulkarni A, et al. Recent advancements of CFD and heat transfer studies in pyrolysis: A review. J Anal Appl Pyrolysis 2023;175:106163. https://doi.org/https://doi.org/10.1016/j.jaap.2023.106163.
4. Sridevi V, Surya DV, Reddy BR, Shah M, Gautam R, Kumar TH, et al. Challenges and opportunities in the production of sustainable hydrogen from lignocellulosic biomass using microwave-assisted pyrolysis: A review. Int J Hydrogen Energy 2023. https://doi.org/https://doi.org/10.1016/j.ijhydene.2023.06.186.
5. Wu L, Guan Y, Li C, Shi L, Yang S, Rajasekhar Reddy B, et al. Free-radical behaviors of co-pyrolysis of low-rank coal and different solid hydrogen-rich donors: A critical review. Chem Eng J 2023;474:145900. https://doi.org/https://doi.org/10.1016/j.cej.2023.145900
6. D. Govindarajan, K. Sivagami, I.M. Nambi, B.N. Ravikumar, M. Kumar, S. Chakraborty, **B.R. Reddy**, Thermo-Chemical conversion of polyolefin-based facemask using bench-scale pyrolysis system, *Energy Sources, Part A Recover. Util. Environ. Eff.* 45 (2023) 542–556. https://doi.org/10.1080/15567036.2023.2172099.
7. **B.R. Reddy,** S. Sarkar, R. Vinu, Microwave-assisted rapid pyrolysis of woodblock without adding susceptor and detailed product analysis, *Biomass Convers. Biorefinery*. (2023). https://doi.org/10.1007/s13399-023-03820-x.
8. D. V Suriapparao, **B.R. Reddy**, C. Sankar, L. Rao, Prosopis juliflora valorization via microwave-assisted pyrolysis : Optimization of reaction parameters using machine learning analysis, *J. Anal. Appl. Pyrolysis.* 169 (2023) 105811. https://doi.org/10.1016/j.jaap.2022.105811.
9. **B.R. Reddy,** A. Malhotra, S. Najmi, M. Baker-Fales, K. Coasey, M. Mackay, D.G. Vlachos, Microwave assisted heating of plastic waste: Effect of plastic/susceptor (SiC) contacting patterns, *Chem. Eng. Process. - Process Intensif.* 182 (2022) 109202. https://doi.org/10.1016/j.cep.2022.109202.
10. D. V. Suriapparao, H.K. Tanneru, **B.R. Reddy**, A review on the role of susceptors in the recovery of valuable renewable carbon products from microwave-assisted pyrolysis of lignocellulosic and algal biomasses: Prospects and challenges, *Environ. Res.* 215 (2022) 114378. https://doi.org/10.1016/J.ENVRES.2022.114378.

11. **B.R. Reddy**, V. Sridevi, T.H. Kumar, C.S. Rao, V.C.S. Palla, D. V. Suriapparao, G.S. Undi, Synthesis of renewable carbon biorefinery products from susceptor enhanced microwave-assisted pyrolysis of agro-residual waste: A review, *Process Saf. Environ. Prot.* 164 (2022) 354–372. https://doi.org/10.1016/J.PSEP.2022.06.027.

12. L. Wu, J. Liu, **B.R. Reddy**, J. Zhou, Preparation of coal-based carbon nanotubes using catalytical pyrolysis: A brief review, *Fuel Process. Technol.* 229 (2022) 107171.

13. L. Wu, H. Wu, **B. R. Reddy**, J. Zhou, R. Vinu, A low-cost and multifunctional bluecoke-based absorbent for high-efficiency microwave pyrolysis of coal, *Fuel.* 313 (2022) 122657. https://doi.org/10.1016/j.fuel.2021.122657.

14. D. V. Suriapparao, T. Hemanth Kumar, **B.R. Reddy**, A. Yerrayya, B.A. Srinivas, P. Sivakumar, S.R. Prakash, C. Sankar Rao, V. Sridevi, J. Desinghu, Role of ZSM5 catalyst and char susceptor on the synthesis of chemicals and hydrocarbons from microwave-assisted in-situ catalytic co-pyrolysis of algae and plastic wastes, *Renew. Energy*. 181 (2022) 990–999. https://doi.org/10.1016/j.renene.2021.09.084.

15. **B.R. Reddy,** R. Vinu, Evidence of interactions in microwave-assisted co-pyrolysis of different varieties of coals, *J. Energy Inst.* 95 (2021) 18–29. https://doi.org/10.1016/j.joei.2020.11.006.

16. **B.R. Reddy**, I. Ashok, R. Vinu, Preparation of carbon nanostructures from medium and high ash Indian coals via microwave-assisted pyrolysis, *Adv. Powder Technol.* 31 (2020) 1229–1240. https://doi.org/10.1016/j.apt.2019.12.017.

17. **B.R. Reddy**, B. Shravani, B. Das, P.S. Dash, R. Vinu, Microwave-assisted and analytical pyrolysis of coking and non-coking coals: Comparison of tar and char compositions, *J. Anal. Appl. Pyrolysis.* 142 (2019) 104614. https://doi.org/10.1016/j.jaap.2019.05.003.

18. R. Gautam, S. Shyam, **B.R. Reddy**, K. Govindaraju, R. Vinu, Microwave-assisted pyrolysis and analytical fast pyrolysis of macroalgae: Product analysis and effect of heating mechanism, *Sustain. Energy Fuels.* 3 (2019) 3009–3020. https://doi.org/10.1039/c9se00162j.

19. **B.R. Reddy**, R. Vinu, Microwave-assisted co-pyrolysis of high ash Indian coal and rice husk : Product characterization and evidence of interactions, *Fuel Process. Technol.* 178 (2018) 41–52. https://doi.org/10.1016/j.fuproc.2018.04.018.

20. B. Debalina, **B. R. Reddy**, R. Vinu, Production of carbon nanostructures in biochar, bio-oil and gases from bagasse via microwave assisted pyrolysis using Fe and Co as susceptors, *J. Anal. Appl. Pyrolysis.* 124 (2017) 310–318. https://doi.org/10.1016/j.jaap.2017.01.018.

21. **B.R. Reddy,** R. Vinu, Microwave assisted pyrolysis of Indian and Indonesian coals and product characterization, *Fuel Process. Technol.* 154 (2016) 96–103. https://doi.org/10.1016/j.fuproc.2016.08.016

BOOK CHAPTER

1. Mishra NK, Wu L, Zhou J, Rajasekhar Reddy B. Microwave-assisted Technologies for Municipal Solid Waste Conversion to Value-added Chemicals and Fuels. Sustain. Radiat. Technol. Waste-biomass Valorization Greener Energy High-Value Prod. Gener., Springer; 2024, p. 139–57. https://doi.org/10.1007/978-3-031-63941-8_6

2. Shravani B, Wu L, Zhou J, Surya D V, Reddy BR. Agricultural Waste as a Source of Fine Chemicals Through Thermochemical Methods. Agric. Waste to Value-Added Prod. Bioprod. its Appl., Springer; 2024, p. 83–103. https://doi.org/10.1007/978-981-97-2535-94
3. T. Patil, S.A. Dharaskar, *B.R. Reddy*, Chapter 8 - Innovations in cryogenic carbon capture, in: M. Khalid, S.A. Dharaskar, M. Sillanpää, H.B.T.-E.C.C.T. Siddiqui (Eds.), Elsevier, 2022: pp. 239–256. https://doi.org/https://doi.org/10.1016/B978-0-323-89782-2.00007-7
4. *B. R. Reddy*, R. Vinu, Feedstock Characterization for Pyrolysis and Gasification In- Coal and Biomass Gasification: Recent Advances and Future Challenges, in: S. De, A.K. Agarwal, V.S. Moholkar, B. Thallada (Eds.), Springer Singapore, Singapore, 2018: pp. 3–36. https://doi.org/10.1007/978-981-10-7335-9_1.

INVITED SPEAKER

[1] **Reddy, B.R,** Microwave Heating for the Pyrolysis of Plastics and Biomass: Effect of Feedstock/Susceptor Contact and Process Variables, Frontiers in Analytical and Applied Pyrolysis for Energy and Environment (*FAAPEE -2024),26-27 Feb, 2024.*

[2] Rantidev and **Reddy, B.R.;** Microwave co-pyrolysis of mixed plastic waste: Effect of blend ratio, PyroAsia – 2024, IIT Guwahati, Nov 28-29, 2024.

[3] **Reddy, B.R.;** Biochar Production Techniques and Efficiency: A crucial consideration for the steel industry, September 15-16, Ranchi, India, 2023 Nov.

CONFERENCE PRESENTATIONS

1. **Reddy, B.R.;** Malhotra, A.; Vlachos, Microwave heating of waste plastics, AICHE-2021, Boston, USA.
2. **Reddy, B.R.;** Shravani, B.; Das, B.; Dash, P.; Vinu, R. Conventional and microwave assisted pyrolysis of coking and non-coking coals, and product characterization, 22nd International Symposium on Analytical and Applied Pyrolysis (Pyro2018), 3rd-8th June 2018, Kyoto, Japan.
3. **Reddy, B.R.;** Vinu, R. Production of carbon nanostructures in coal char, oil and gases from low and medium rank Indian coals via microwave assisted pyrolysis using Fe as susceptor, Second International Conference on Sustainable Energy and Environmental Challenges (SEEC-2018), 31st Dec -3rd Jan. 2018, Bangalore, IIT Madras.
4. **Reddy, B.R.;** Vinu, R. Microwave assisted co-pyrolysis of high ash Indian coals and rice husk for liquid fuel production, 2017 International Conference on Coal Science & 2017 Australia-China Symposium on Energy, 25th-29th Sep. 2017, Beijing, China.
5. **Reddy, B.R.;** Vinu, R. Microwave assisted pyrolysis of coal blends from different regions and product characterization, 2017 International Conference on Coal Science & 2017 Australia-China symposium on Energy, 25th-29th Sep. 2017, Beijing, China.
6. **Reddy, B.R.;** Vinu, R. Experimental study of microwave assisted pyrolysis of Indian and Indonesian coals, CHEMCON 2015, Dec. 2015, Guwahati, India.
7. **Reddy, B.R.;** Vinu, R. Microwave assisted liquefaction of coals, 11th IEA Workshop of the Clean Coal Center and Mercury Emissions from Coal and Energy Efficiency Workshops, 16th-20th Nov. 2015, Chennai, India.

EXTERNALLY FUNDED PROJECTS

- A prototype for 1000LPM hydrogen production from Indian agro-residues using integrated microwave pyrolysis and steam reforming system, DST, Climate Change and Clean Energy (C3E) - Hydrogen & Fuel Cell Call ~ 2.5 Cr INR (Approved for Funding).

PROFESSIONAL (PEER-REVIEW) SERVICE

Reviewer **2020-Present**

- Journal of Thermal Analysis and Calorimetry
- Journal of the Energy Institute
- Energy Conversion and Management

PROFESSIONAL MEMBERSHIP

Member **2020-Till Now**

- The American Institute of Chemical Engineers (AIChE)
- The Indian Institute of Chemical Engineers (IIChE)

REFERENCES

[1] Dr. R. Vinu, Professor (Ph.D. Advisor)

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[2] Prof. Dionisios G. Vlachos (Postdoc Advisor)

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[3] Prof. R. Ravikrishna (Doctoral Committee Member)

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