Vinay Kumar Rajak

Associate Professor, Department of Petroleum Engineering,
Indian Institute of Technology (Indian School of Mines) Dhanbad, India - 826004
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Marital status Married

Citizenship Indian

Experience

Associate Professor **April, 2026 – Present**
Department of Petroleum Engineering,
Indian Institute of Technology (Indian School of Mines), Dhanbad,
India

Assistant Professor **September, 2010 – April, 2026**
Department of Petroleum Engineering,
Indian Institute of Technology (Indian School of Mines), Dhanbad,
India

Research interests

- Drilling and Workover Fluids
- Drilling
- Geothermal
- Hydrogen Storage and Transportation
- CCUS
- Well Integrity

Education

Ph. D. **2017**
Department of Petroleum Engineering,
Indian Institute of Technology (Indian School of Mines), Dhanbad, India
Dissertation: ***Optimization of Process Parameters for Separation of Oil from Oil-in-Water Emulsion.***
Guide: Prof. Ajay Mandal

Post-Graduation: M. Tech in Petroleum Engineering **2007 – 2009**
Indian Institute of Technology (Indian School of Mines), Dhanbad, India

Graduation: B. Tech in Mechanical Engineering **2003-2007**
Visvesvaraya National Institute of Technology, Nagpur, India

Research publications

1. Maji, S., **Rajak, V.K.,** Kiran, R., Upadhyay, R., Gupta, S.D. and Anand, M., 2027. Inhibitive performance of water-based drilling fluids by using amine derivatives and associated polymers as an additive for water sensitive shale formations: a review. *Applied Clay Science*, *295*, p.108436. https://doi.org/10.1016/j.clay.2026.108436 **(Impact Factor: 5.2, Q1)**
2. Upadhyay, R., Kumar, R., Kumar, A., Mobarsha, G., Kiran, R. and **Rajak, V.K.**, 2026. Coalbed methane (CBM) well performance: A new methodology combining IPR and VLP analysis. International Journal of Coal Science & Technology, 13(1), p.16. https://doi.org/10.1007/s40789-025-00844-8 **(Impact Factor: 10.1, Q1)**
3. Kiran, R., Saif, M., Wood, D.A., Datta Gupta, S., Kumar, A., Upadhyay, R. and **Rajak, V.K.**, 2025. Geological Hydrogen Prospectivity of Iron Ore Deposits in India Based on Semiquantitative Analysis. *ACS omega*, *10*(25), pp.27332-27347. https://doi.org/10.1021/acsomega.5c02770 **(Impact Factor: 4.3, Q2)**
4. Doley, A., **Rajak, V.K.**, Kiran, R., Mahto, V., Upadhyay, R., Eswaran, U. and Yadav, P., 2025. Enhancing the Shale Drilling Compatibility Using Hydroxyethyl Acrylate Chitosan. *Arabian Journal for Science and Engineering*, 50, 21299–21313. https://doi.org/10.1007/s13369-025-10371-y **(Impact Factor: 2.9, Q2)**
5. Gautam, S., Kumar, S., Kumar, A., **Rajak, V.K.** and Guria, C., 2025. Development of functional polymer-based clay-free HPHT drilling fluid: Effect of molecular weight and its distribution on drilling fluid performance. *Geoenergy Science and Engineering*, 246, p.213616. https://doi.org/10.1016/j.geoen.2024.213616 **(Impact Factor: 4.6, Q1**)
6. Kiran, R., Upadhyay, R., **Rajak, V.K**., Kumar, A. and Gupta, S.D., 2024. Underpinnings of reservoir and techno-economic analysis for Himalayan and Son-Narmada-Tapti geothermal sites of India. *Renewable Energy*, 237, p.121630. https://doi.org/10.1016/j.renene.2024.121630 **(Impact Factor: 9.1, Q1)**
7. Kiran, R., **Rajak, V.K.**, Upadhyay, R. and Kumar, A., 2024. Comparative techno-economic assessment of superhot rock and conventional geothermal energy feasibility for decarbonizing India. *Geothermics*, 122, p.103078. https://doi.org/10.1016/j.geothermics.2024.103078 **(Impact Factor: 3.9, Q1)**

8. Saif, M., Kiran, R., **Rajak, V.K.** and Verma, R.K., 2024. Investigation of an Indian Site with Mafic Rock for Carbon Sequestration. *ACS omega*, 9(28), pp.30270-30280. https://doi.org/10.1021/acsomega.4c00213 **(Impact Factor: 4.3, Q2)**

9. Doley, A., Mahto, V., **Rajak, V.K.**, Kiran, R. and Upadhyay, R., 2024. Investigation of Filtration and Shale Inhibition Characteristics of Chitosan-N-(2-hydroxyl)-propyl trimethylammonium Chloride as Drilling Fluid Additives. *ACS omega*, 9(19), pp.21365-21377. https://doi.org/10.1021/acsomega.4c01632 **(Impact Factor: 4.3, Q2)**

10. Banerjee, S., Banik, A., **Rajak, V.K.**, Bandyopadhyay, T.K., Nayak, J., Jasinski, M., Kumar, R., Jeon, B.H., Siddiqui, M.R., Khan, M.A. and Chakrabortty, S., 2024. Two-Phase Crude Oil–Water Flow Through Different Pipes: An Experimental Investigation Coupled with Computational Fluid Dynamics Approach. *ACS omega*, 9(10), pp.11181-11193. https://doi.org/10.1021/acsomega.3c05290 **(Impact Factor: 4.3, Q2)**

11. Das, D., Anand, A., Gautam, S. and **Rajak, V.K.**, 2024. Assessment of utilization potential of biomass volatiles and biochar as a reducing agent for iron ore pellets. *Environmental Technology*, 45(1), pp.158-169. https://doi.org/10.1080/09593330.2022.2102936 **(Impact Factor: 2.0, Q3)**

12. Doley, A., Mahto, V., **Rajak, V.K.** and Suri, A., 2023. Development of a High-Performance Drilling Fluid Additive for Application in Indian Shale Gas Formations. *Energy & Fuels*, 37(17), pp.12824-12837. https://doi.org/10.1021/acs.energyfuels.3c02066 **(Impact Factor: 5.2, Q1)**

13. Kiran, R., Upadhyay, R., **Rajak, V.K.**, Gupta, S.D. and Pama, H., 2023. Comprehensive study of the underground hydrogen storage potential in the depleted offshore Tapti-gas field. *International Journal of Hydrogen Energy*, 48(3), p. 12396-12409. https://doi.org/10.1016/j.ijhydene.2022.12.172 **(Impact Factor: 8.3, Q1)**

14. Upadhyay, R., Datta Gupta, S. and **Rajak, V.K.**, 2023. Impact of pressure-dependent diffusivity on transient pressure analysis of a dry Coalbed Methane (CBM) wells: A new approach. *Journal of Earth System Science*, *132*(1), p.34. https://doi.org/10.1007/s12040-022-02040-7 **(Impact Factor: 1.7, Q3)**

15. Gautam, A., Yadav, R.K., Ajit, K.P. and **Rajak, V.K.**, 2023. A review on CDM-based ductile models and its application. *Transactions of the Indian Institute of Metals*, 76(5), pp.1141-1154. https://doi.org/10.1007/s12666-022-02790-4 **(Impact Factor: 1.5, Q3)**

16. Sah, R.K., Kumar, A., Gautam, A. and **Rajak, V.K.**, 2022. Temperature independent FBG based displacement sensor for crack detection in civil structures. *Optical Fiber Technology*, *74*, p.103137. https://doi.org/10.1016/j.yofte.2022.103137 **(Impact Factor: 2.7, Q2)**

17. Rajak, V.K., Gautam, S., Ajit, K.P., Kiran, R. and Madhumaya, A., 2022. Rheological Property Measurement and Application of Formate-Based Drilling Fluids at Elevated Temperatures: A Review. *MAPAN*, 37(3), pp.665-681. https://doi.org/10.1007/s12647-022-00546-5 **(Impact Factor: 1.3, Q4)**

18. Datta Gupta, S., Upadhyay, R. and **Rajak, V.K.**, 2022. Establishment of economic viability for hydrocarbon production through a geocellular model developed in challenging geological reservoir of onshore sedimentary basin, India. *Himalayan Geology*, 43(2), pp. 471-489. **(Impact Factor: 0.9, Q3)**

19. Gautam, S., Guria, C. and **Rajak, V.K.**, 2022. A state of the art review on the performance of high-pressure and high-temperature drilling fluids: Towards understanding the structure-property relationship of drilling fluid additives. *Journal of Petroleum Science and Engineering*, 213, p.110318. https://doi.org/10.1016/j.petrol.2022.110318 **(Impact Factor: 5.16, Q1**)

20. Kiran, R., Dansena, P., Salehi, S. and **Rajak, V.K.**, 2022. Application of machine learning and well log attributes in geothermal drilling. *Geothermics*, 101, p.102355. https://doi.org/10.1016/j.geothermics.2022.102355 **(Impact Factor: 3.9, Q1)**

21. **Rajak, V.K.**, Kumar, S., Thombre, N.V. and Mandal, A., 2018. Synthesis of activated charcoal from saw-dust and characterization for adsorptive separation of oil from oil-in-water emulsion. *Chemical Engineering Communications*, 205(7), pp.897-913. https://doi.org/10.1080/00986445.2017.1423288 **(Impact Factor: 2.0, Q3)**

22. **Rajak, V.K.**, Kumar, H. and Mandal, A., 2016. Kinetics, equilibrium and thermodynamic studies of adsorption of oil from oil-in-water emulsion by activated charcoal. *International Journal of Surface Science and Engineering*, 10(6), pp.600-621. https://doi.org/10.1504/IJSURFSE.2016.081038 **(Impact Factor: 1.2, Q4)**

23. **Rajak, V.K.**, Singh, I., Kumar, A. and Mandal, A., 2016. Optimization of separation of oil from oil-in-water emulsion by demulsification using different demulsifiers. *Petroleum Science and Technology*, 34(11-12), pp.1026-1032. https://doi.org/10.1080/10916466.2016.1181654 **(Impact Factor: 1.4, Q3)**

24. **Rajak, V.K.**, Relish, K.K., Kumar, S. and Mandal, A., 2015. Mechanism and kinetics of separation of oil from oil-in-water emulsion by air flotation. *Petroleum Science and Technology*, 33(23-24), pp.1861-1868. https://doi.org/10.1080/10916466.2015.1108987 **(Impact Factor: 1.4, Q3)**

Conference paper

1. Imtiaz, M., **Rajak, V.K.**, Dei, S., Chhateja, J. and Biswas, A., 2016, March. AquaticOil Spill Remediation by Using Automated Unmanned Boat AUB. In *Offshore Technology Conference Asia*. Offshore Technology Conference.

Awards/ scholarship

- **Graduate Aptitude Test for Engineering (GATE), 2006**
  Mechanical Engineering
- **Graduate Aptitude Test for Engineering (GATE), 2007**
  Mechanical Engineering

Teaching experience

Courses Taught:

- Reservoir Engineering
- Drilling Technology
- Drilling Fluids & Cements
- Pipeline Engineering
- Well Intervention and Stimulation Techniques
- Well Performance & Artificial Lift Techniques
- Health Safety & Environment in Petroleum Industry
- Petroleum Environment, Health and Safety Practices

Ph. D. students supervised

- Amolina Doley (18DR0024): Degree awarded in November-2024 (Supervisor)

Ph. D. students supervising

- Mohit Anand (20DR0078): Registered in 2020 (Supervisor)
- Aditya Suman (23DP0108): Registered in 2023 (Supervisor)
- Parmod Sharma (23DP0071): Registered in 2023 (Co-Supervisor)
- Somen Ghosh (24DP0044): Registered in 2024 (Supervisor)
- Rakesh Kumar Behera (24DR0142): Registered in 2024 (Supervisor)
- Vikash Raj (24DP0070): Registered in 2024 (Co-Supervisor)
- Praveen Kumar (24DP0036): Registered in 2024 (Co-Supervisor)
- Chandana Roy (24DR0248): Registered in 2024 (Co-Supervisor)
- Saptarshi Maji (23MT0352): Registered in 2025 (Supervisor)
- Pramod Kumar Singh (25DP0052): Registered in 2025 (Co-Supervisor)
- Kislay Chaurasia (25DP0109): Registered in 2025 (Supervisor)
- Govind Narayan (26DP0023): Registered in 2026 (Supervisor)
- Jibanendu Mohapatra (26DP0123): Registered in 2026 (Supervisor)
- Dona Diana Sindhu Oliver (26DP0146): Registered in 2026 (Supervisor)

Oil and gas field visit & training

- One week field training at CAIRN INDIA, Barmer, Rajasthan from 11-10-2010 to 16-10-2010.
- One-week field training at ONGC Effluent Treatment Plant (ETP) Limbodra, Ahmedabad from 12-09-2016 to 17-09-2016.

- Two-week training at CBM ONGC Bokaro Asset under faculty mobility program (FMP) from 18-07-2019 to 27-07-2019.
- Two-week training at Essar Oil and Gas Exploration and Production Ltd., Durgapur under faculty mobility program (FMP) from 04-07-2022 to 17-07-2022.

Administrative responsibilities (Institute Level)

- Treasurer BASANT-2026
- Convenor of SRIJAN-2025
- Co-Convenor of BASANT-2024
- Deputy Chief Election Officer of Student Gymkhana Election - 2024
- Member of GATE-JAM Committee - 2023-2024
- Treasurer III & BASANT-2023
- Treasurer Concetto 2023
- Centre observer Duty as IR for IISER Aptitude Test (IAT) 2026
- Institute Representative for conducting JEE Adv. Examination 2026
- Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2026
- Institute Representative for conducting JEE Adv. Examination 2025
- Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2025
- Institute Representative for conducting JEE Adv. Examination 2024
- Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2024
- Institute Representative (Roving Officer) for conducting JEE Adv. Examination 2023
- Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2023
- Institute Representative for conducting JEE Adv. Examination 2022
- Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2022
- Institute Representative for conducting JEE Adv. Examination 2021
- Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2021

Administrative responsibilities (Departmental Level)	• Institute Representative for conducting JEE Adv. Examination 2020 • Reporting Centre (RC) Officers for Joint Seat Allocation Authority (JoSAA) Counselling-2020 • Hostel warden of Diamond Hostel (2013 – 2018) • Students Training/Internship In-charge (2024 to till date) • Faculty Convener of Petrotech Society – FIPI IIT (ISM) Dhanbad Chapter (2019-2023) • Member of departmental Purchase Committee (2022-2023) • Faculty in-Charge of Drilling Fluids & Cement Laboratory (2020-Present) • Faculty Co-Coordinator of Society of Petroleum Engineers (2016-2019) • Timetable in-Charge of Petroleum Engineering Department (2016-2019) • Faculty in-Charge Training & Placement (2016-2019) • Faculty Mentor of Foreign Students (2017 – 2018) • Faculty Coordinator of Petroleum Department of Technical Fest Concetto (2015-2018) • Faculty in-Charge of Minor Courses (2014-2017) • Tabulator for Semester Examination (2011-2015)
Sponsored research project	• **Design, Synthesis, and Development of Next-Generation Green Cement Composites for Enhanced Geothermal Systems in Jharkhand.** *Jharkhand council on Science, Technology and Innovation (JCSTI)* **Ongoing** *Ranchi* *2026-2029* Role (PI/Co-PI) PI Grant Amont: 5,48,000 INR • **Development of an Integrated Workflow Based on Geoscientific Data Analysis for Identification of Coal Bed Methane (CBM) Resource Prospectivity at the Bidding Stage.** *Directorate General of Hydrocarbons (DGH)* **Ongoing** *Noida* *2025-2027* Role (PI/Co-PI) PI Grant Amont: 8,80,000 INR

	• **Development of Advection-Diffusion Based Chemo-Thermo-Physical Model for Post fracturing Pressure Build-up in Shale Formation.** *Science & Engineering Research Board (SERB)* **Ongoing** *New Delhi* *2024-2027* Role (PI/Co-PI) PI Grant Amont: 6,60,000 INR • **Feasibility study of existing pipelines for hydrogen storage and transportation.** *BinSys Technologies* **Completed** *New Delhi* *2022-2024* Role (PI/Co-PI) PI Grant Amount: 5,42,800 INR • **Design, Application and Modeling of drilling fluid for High Pressure and High Temperature (HPHT) wells** **Completed** *FRS Scheme* *2019-2022* *Indian Institute of Technology (Indian School of Mines), Dhanbad* Role (PI/Co-PI) PI Grant Amount: 10,00,000 INR • **Characterization and Separation of Oil-in-Water Emulsion.** **Completed** *FRS Scheme* *2012-2014* *Indian Institute of Technology (Indian School of Mines), Dhanbad* Role (PI/Co-PI) PI Grant Amount: 1,00,000 INR
Consultancy	• **Study on the adsorption isotherm behavior of coal samples conducted for Mining Associates Private Limited** *Mining Associates private Limited* **Ongoing** *Asansol, West Bengal* *2025-2026* Role (CI/Co-CI) CI Grant Amount: 1,18,000 INR

	• **"Adsorption Isotherm Studies of Shale Formation of Gondwana Basin" for CMPDI** *Central Mine Planning & Design Institute Limited (CMPDIL)* **Ongoing** *Ranchi, Jharkhand* *2025-2026* Role (CI/Co-CI) CI Grant Amount: 1,02,660 INR • **Supervising the Injection/Fall-Off Tests and Performing Pressure Transient Analysis in Five Core Holes of Jharia CBM Block of Prabha Energy Private Limited (PEPL)** *Prabha Energy Pvt. Ltd. (PEPL)* **Completed** *Asansol, West Bengal* *2024-2025* Role (CI/Co-CI) Co-CI Grant Amount: 9,44,000 INR • **Pressure Transient Analysis of Wells of Raniganj CBM field for Mining Associates.** *Mining Associates Limited* **Completed** *Asansol, West Bengal* *2022-2023* Role (CI/Co-CI) CI Grant Amount: 3,26,766 INR • **Subject Matter Expert (SME) Advisory & Technical Support to Cairn Oil & Gas for Pre-Drilling, Coring, and Post-Drilling Activities" for Cairn Oil & Gas (Vedanta Limited)** *Cairn Oil & Gas (Vedanta Ltd.)* **Ongoing** *Gurugram, Haryana* *2025-2026* Role (CI/Co-CI) Co-CI Grant Amount: 1,68,74,000 INR • **Study of Core Samples from Coal Bed Methane (CBM) Exploration Core Wells** *Mining Associates Limited* **Ongoing** *Asansol, West Bengal* *2025-2026* Role (CI/Co-CI) Co-CI Grant Amount: 59,59,000 INR

	• **Interpretation of Injection Fall-Off Test Data** *Mining Associates Limited* **Ongoing** *Asansol, West Bengal* *2026-2027* Role (CI/Co-CI) Co-CI Grant Amount: 18,68,325 INR • **CBM-Related Analysis for ONGC CBM Block of Sohagpur, Madhya Pradesh" for MMPL PVT. LTD.** *MMPL Pvt. Ltd. (MMPL),* **Ongoing** *Kolkata, West Bengal* *2026-2027* Role (CI/Co-CI) Co-CI Grant Amount: 1,29,42,240 INR

References

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Prof. Rajeev Upadhyay
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