CURRICULUM VITAE

Dr. SAMIR KUMAR PAL

Current Position and Address:

Professor
Department of Mining Engineering
Indian Institute of Technology Kharagpur
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Date of Birth : 18th February 1958

Educational Qualifications:

Sl. No.	Degree/Certificate	Year of Passing	University/Institute	Subjects
1.	Doctorate of Philosophy	2002	Indian Institute of Technology Kharagpur	Abrasion of Elastomers by Rocks
2.	Master of Technology	1980	Indian Institute of Technology Kharagpur	Mine Planning and Mechanization
3.	Bachelor of Technology	1978	Indian Institute of Technology Kharagpur	Mining Engineering
4.	Higher Secondary Certificate	1973	West Bengal Board of Secondary Education	Science

Academic/Research Experiences/Employment:

No.	From	To	Name of Organization	Position held
1	17-01-2020	27.02.2023	Mining Engineering, Indian Institute of Technology Kharagpur	Head, Mining Engineering
2	01-03-2016	30-06-2019	Indian Institute of Technology Kharagpur	Warden, Radar Flat
3	November 2011	30.06.2023	Indian Institute of Technology Kharagpur	Professor
4	August 2004	November 2011	Indian Institute of Technology Kharagpur	Associate Professor
5	September 1991	August 2004	Indian Institute of Technology Kharagpur	Assistant Professor
6	February 1981	September 1991	Indian Institute of Technology Kharagpur	Lecturer

Honors/Awards Received:

1. Received 'Institute Gold Medal (1992-93)' of Mining, Geological and Metallurgical Institute of India in 1993 for the best paper of the year. This paper is on 'Design Modification of Backfilling System of Mosabani Mine'.
2. Received the 'Certificate of Merit' for a paper published in the Journal of Institute of Engineers (India) Ltd. in the year 1994 on cost optimization. The paper is on environmental cost modeling.
3. Received "Sukumar Rakshit Award" for the year 2002-2003 instituted by the Mining, Geological and Metallurgical Institute of India for significant contribution in the area of Rock Mechanics.
4. Received 'Rashtriya Gaurav Award' from Indian International Friendship Society in November 2011.
5. Received 'Institute's Silver Medal (2011-2012)' of Mining, Geological and Metallurgical Institute of India in 2012 for the paper on 'An Investigation on Operational Characteristics of Surface Miners'.
6. Received 'Institute Silver Medal (2013-14)' of Mining, Geological and Metallurgical Institute of India in 2014 for the paper on 'A Study on Loose Material Filled PVC Props as an Alternative to Conventional Wooden Supports'.
7. Received 'D. N. Thakur Award (2015-2016)' of Mining, Geological and Metallurgical Institute of India in 2016.
8. Received 'Institute's Bronze Medal (2015-16)' of Mining, Geological and Metallurgical Institute of India in 2016 for the paper on 'Improving Productivity of Bord and Pillar Panel by Side Discharge Loader Indian Coal Mines'.
9. Received 'National Geoscience Award (2017-2018)' of Ministry of Mines, Government of India in 2018.
10. Received 'Bharat Vikas Award (2019-2020)' of Institute of Self Reliance at Bhubaneswar, Odisha, India.

Professional Affiliations:

1. Fellow : Institute of Engineers (India)
2. Life Member : Mining, Geological and Metallurgical Institute of India
3. Ex-Chairman of Technical Sub-Committee of the Standing Scientific Research Committee (SSRC) of the Ministry of Coal.
4. Ex-Member of Constitution of Resource Group of academic and research institutions for research activities related to Coal Gasification, underground mining and dealing with Jharia fire.
5. Professional Member, Society of Mining Engineering, USA, International, 2021

Doctoral Guidance:

#	Name of Student	Department	Degree	On-role	DSC type	Year
1.	Chinmoy Mandal	Mining Engineering	PHD	P	Supervisor	Thesis submitted
1	Sayantan Chakraborty	Mining Engineering	PHD	P	Joint Supervisor	2022

2	Sathish Kumar P	Mining Engineering	PHD	P	Supervisor	2021
3	Rohan Bisai	Mining Engineering	PHD	P	Single Supervisor	2021
4	Susmita Panda	Mining Engineering	PHD	P	Supervisor	2017
5	Sneha Rani	Mining Engineering	PHD	P	Joint Supervisor	2017
6	Kaushik Pal	Mining Engineering	PHD	P	Supervisor	2010
7	S. K. MUKHOPADHYAY	Mining Engineering	PHD	P	Joint Supervisor	2006
8	Snehamoy Chatterjee	Mining Engineering	PHD	P	Supervisor	2006

MS GUIDANCE

#	Name of Student	Department	Degree	On-role	DSC type	Year
1	Soumily Ghosh	Mining Engineering	MS	P	Joint Supervisor	2020
2	Sudipta Bhattacharjee	Mining Engineering	MS	P	Supervisor	2011
3	R Rajasekar	Mining Engineering	MS	P	Supervisor	2008

PDF MENTOR

#	Name of Student	Department	Degree	On-role	DSC type	Year
1	C. MOGANAPRIYA	Mining Engineering	PDF SCHOLAR	P	Supervisor	Nov 21-till date

Professional Affiliations:

Fellow : Institute of Engineers (India)
Life Member : Mining, Geological and Metallurgical Institute of India

List of Journal Publications (In reverse chronological order):

Google Scholar Citations: **1253**, h-index: **19**, i10-index: **32**

1. Turlapati VY, Prusty BK, **Pal SK**, Raja E. Examining Supercritical Methane Adsorption on Nanoporous Shales Using Constant and Varying Adsorbed Phase Density Approaches. Energy & Fuels. 2023;37(3):2078-90.
2. Roy R, Chakraborty S, Bisai R, **Pal SK**, Mishra S. Gravity Blind Backfilling of Abandoned Underground Mine Voids Using Suitable Mix Proportion of Fill Materials and Method of Filling. Geotechnical and Geological Engineering. 2023:1-19.

3. Palaniappan SK, **Pal SK**, Chinnasamy M, Rathanasamy R. Efficiency of Rock Cutting and Wear Behavior of Coated Bits via Lab-Scale Linear Rock-Cutting Machine: Experimental Approach. International Journal of Geomechanics. 2023;23(2):06022041.
4. Mondal C, Pandey A, **Pal SK**, Samanta B, Dutta D. Hyperspectral measurement technique based rapid determination of coal quality parameters of Jharia and Raniganj basin coal. Infrared Physics & Technology. 2023;128:104504.
5. Chinnasamy M, Rathanasamy R, Palaniappan SK, **Pal SK**. Microstructural transformation analysis of cryogenic treated conical rock cutting bits for mining applications. International Journal of Refractory Metals and Hard Materials. 2023;110:105995.
6. Turlapati VY, Prusty BK, Yarlagadda DK, **Pal SK**, Raja E. Analysis of micropore size distribution using Dubinin's theory of volume filling-Effect of particle size on pore characterization of organic-rich Indian shales. Journal of Natural Gas Science and Engineering. 2022;106:104746.
7. Palaniappan SK, **Pal SK**, Chinnasamy M, Rathanasamy R, Kaliyannan GV. Multi-response optimization for evaluating output responses in rock cutting through grey-fuzzy-coupled Taguchi technique. Mining, Metallurgy & Exploration. 2022;39(3):1133-48.
8. Mondal C, Pandey A, **Pal SK**, Samanta B, Dutta D. Prediction of gross calorific value as a function of proximate parameters for Jharia and Raniganj coal using machine learning based regression methods. International Journal of Coal Preparation and Utilization. 2022;42(12):3763-76.
9. Chinnasamy M, Rathanasamy R, Sivaraj S, Velu Kaliyannan G, Palanisamy M, **Pal SK**, et al. Effective Utilization of Synthesized FeS 2 for Improving Output Performance of Polycrystalline Silicon Solar Cell. Advances in Materials Science and Engineering. 2022;2022.
10. Chinnasamy M, Rathanasamy R, Palaniappan SK, **Pal SK**. Investigation of TiAlN, AlTiN, and TiAlSiN Coated Inserts on the Machining Performance of AISI 420 Steel and Multi-Objective Optimization of Process Parameters. Journal of The Institution of Engineers (India): Series D. 2022:1-11.
11. Chinnasamy M, Rathanasamy R, **Pal SK**, Palaniappan SK. Effectiveness of cryogenic treatment on cutting tool inserts: A review. International Journal of Refractory Metals and Hard Materials. 2022:105946.
12. Chakraborty S, Bisai R, Palaniappan SK, **Pal SK**. Characterization of fracture pattern of Indian coal measure rock under uniaxial compression stress by statistical analysis of fractal dimension of the microcrack orientation. Journal of The Institution of Engineers (India): Series D. 2022;103(1):95-106.
13. Aruchamy K, Subramani SP, Palaniappan SK, **Pal SK**, Mylsamy B, Chinnasamy V. Effect of blend ratio on the thermal comfort characteristics of cotton/bamboo blended fabrics. Journal of Natural Fibers. 2022;19(1):105-14.

14. Roy R, Chakraborty S, Bisai R, Palaniappan SK, **Pal SK**. Suitability of bottom ash for stowing in underground coal mines with and without addition of settling agent. Journal of The Institution of Engineers (India): Series D. 2021;102:505-20.
15. Paramasivam P, Rathanasamy R, Ranganathan R, Palaniappan SK, **Pal SK**. Husking and mechanical properties of ISAF N231/SAF N110 carbon black filled XNBR-ENR blend rubber compound for rice husk removal applications. Materials Testing. 2021;63(8):783-7.
16. Palaniappan SK, **Pal SK**, Chinnasamy M, Rathanasamy R. Performance assessment of hard coating on rock cutting bit and process parameter optimization through multi-response approach using DEAR-Taguchi technique. Arabian Journal of Geosciences. 2021;14:1-14.
17. **Pal SK**, Tripathi AK, Panda S, Palaniappan SK. Sonar mapping of abandoned water-logged underground coal mine and backfilling operation using underwater camera. International Journal of Mining and Mineral Engineering. 2021;12(3):181-94.
18. Lakshminarayana C, Tripathi AK, **Pal SK**. Experimental investigation on potential use of drilling parameters to quantify rock strength. International Journal of Geo-Engineering. 2021;12(1):23.
19. Harikrishna Kumar M, Subramaniam S, Rathanasamy R, **Pal SK**, Palaniappan SK. Influence of Dual fIller reInforcement on the curIng anD trIbo-mechanIcal behavIour of natural rubber nanocomposIte for tIre treaD applIcatIon. Archives of Metallurgy and Materials. 2021:893-9--9.
20. Bhuvaneshwaran M, Subramani SP, Palaniappan SK, **Pal SK**, Balu S. Natural cellulosic fiber from Coccinia Indica stem for polymer composites: Extraction and characterization. Journal of Natural Fibers. 2021;18(5):644-52.
21. Rani S, Prusty BK, **Pal SK**. Characterization of shales from Damodar valley coalfields for CH4 recovery and CO2 sequestration. Environmental Technology & Innovation. 2020;18:100739.
22. Palaniappan SK, Rathanasamy R, Chellamuthu S, **Pal SK**. Development Of Shape Memory Alloy Based Quarter Car Suspension System. Journal of Mechanical Engineering Research. 2020;3(1).
23. Palaniappan SK, **Pal SK**, Dikshit M, editors. A study on rock cutting forces and wear mechanisms of coated picks by lab-scale linear cutting machine. Proceedings of the 28th International Symposium on Mine Planning and Equipment Selection-MPES 2019 28; 2020: Springer International Publishing.
24. **Pal SK**, Pandey N, Tripathi AK. Characteristics of vibration at failure and its relation to rock properties during tensile failure. Journal of Mines, Metals and Fuels. 2020:115-9.
25. Mylsamy B, Palaniappan SK, Subramani SP, **Pal SK**, Sethuraman B. Innovative characterization and mechanical properties of natural cellulosic Coccinia Indica fiber and its composites. Materials Testing. 2020;62(1):61-7.

26. Mohan Kumar HK, Subramaniam S, Rathanasamy R, **Pal SK**, Palaniappan SK. Substantial reduction of carbon black and balancing the technical properties of styrene butadiene rubber compounds using nanoclay. Journal of Rubber Research. 2020;23:79-87.
27. Lakshminarayana C, Tripathi AK, **Pal SK**, editors. Quantification of Rock Strength Using the Mechanical Drilling Parameters. International Conference on Emerging Trends in Engineering (ICETE) Emerging Trends in Smart Modelling Systems and Design; 2020: Springer International Publishing.
28. Lakshminarayana C, Tripathi AK, **Pal SK**, editors. MWD technique to estimate the uniaxial compressive strength of rocks. AIP Conference Proceedings; 2020: AIP Publishing LLC.
29. Lakshminarayana C, Tripathi AK, **Pal SK**. Rock strength characterization using measurement while drilling technique. Indian Geotechnical Journal. 2020;50:994-1005.
30. Lakshminarayana C, Tripathi AK, **Pal SK**. Prediction of mechanical properties of sedimentary type rocks using rotary drilling parameters. Geotechnical and Geological Engineering. 2020;38:4863-76.
31. Chinnasamy S, Rathanasamy R, Kumar HKM, Jeganathan PM, Palaniappan SK, **Pal SK**. Reactive compatibilization effect of graphene oxide reinforced butyl rubber nanocomposites. Polímeros. 2020;30.
32. Bisai R, Palaniappan SK, **Pal SK**. Influence of individual and combined pre-treatment on the strength properties of granite and sandstone. Arabian Journal of Geosciences. 2020;13:1-10.
33. Bisai R, Palaniappan SK, **Pal SK**. Effects of high-temperature heating and cryogenic quenching on the physico-mechanical properties of limestone. SN Applied Sciences. 2020;2:1-10.
34. Rani S, Prusty BK, Padmanabhan E, **Pal SK**. Applicability of various adsorption isotherm models on adsorption of methane and CO2 on Indian shales. Environmental Progress & Sustainable Energy. 2019;38(6):13222.
35. Rani S, Padmanabhan E, Bakshi T, Prusty BK, **Pal SK**. CO2 sorption and rate characteristics in micropores of shales. Journal of Natural Gas Science and Engineering. 2019;68:102903.
36. **Pal S**. Design and Analysis of Silicon Photonic Switches and Modulators Using Pin Diode and Junction-Less Structures: IIT Patna; 2019.
37. Mylsamy B, Palaniappan SK, Subramani SP, **Pal SK**, Aruchamy K. Impact of nanoclay on mechanical and structural properties of treated Coccinia indica fibre reinforced epoxy composites. Journal of Materials Research and Technology. 2019;8(6):6021-8.
38. Lakshminarayana C, Tripathi AK, **Pal SK**. Estimation of rock strength properties using selected mechanical parameters obtained during the rotary drilling. Journal of The Institution of Engineers (India): Series D. 2019;100:177-86.
39. Chinnasamy M, Rathanasamy R, Kannayiram P, Palaniappan SK, **Pal SK**, Somasundaram M, et al. Experimental investigation on the effect of multilayer TiCN/TiAlN/WC-C coating on the

tribological behaviour of tool inserts for machining applications. International Journal of Materials Engineering Innovation. 2019;10(3):186-202.

40. Chakraborty S, Bisai R, Palaniappan SK, **Pal SK**. Failure modes of rocks under uniaxial compression tests: an experimental approach. Journal of Advances in Geotechnical Engineering. 2019;2(3):1-8.
41. Tuli Bakshi BKP, K. Pathak, **Samir Kumar Pal**. Pore Characteristics of Damodar Valley Shale and Their Effect on Gas Storage Potential. Journal of Petroleum Science and Engineering. 2018;162:725-35.
42. Moganapriya C, Rajasekar R, Ponappa K, Kumar PS, **Pal SK**, Kumar JS. Effect of coating on tool inserts and cutting fluid flow rate on the machining performance of AISI 1015 steel. Materials Testing. 2018;60(12):1202-8.
43. Lakshminarayana C, Tripathi A, **Pal S**. Prediction of physico-mechanical properties of rocks using dominant frequency of vibration during rotary drilling. 2018.
44. D. Jayanth PSK, Ganesh Chandra Nayak, J. Saravana Kumar, **Samir Kumar Pal**, R. Rajasekar. A Review on Biodegradable Polymeric Materials Striving Towards the Attainment of Green Environment. Journal of Polymers and the Environment. 2018;26:838-65.
45. Bisai R, Goel S, Hatwal A, **Pal S**, Majumder A, Nandi T. Effect of cryogenic pre-treatment on breakage characteristics of rocks. Journal of Mining Science. 2018;54:202-11.
46. Tuli Bakshi BKP, K. Pathak, B. R. Nayak, D. Mani, **Samir Kumar Pal**. Source Rock Characteristics and Pore Characterization of Indian Shale. Journal of Natural Gas Science and Engineering. 2017;45:761-70.
47. **Samir Kumar Pal** KUMR, P. Sathish Kumar, R. Rajasekar. Influence of Rock Properties on Wear of M and SR Grade Rubber with Varying Normal Load and Sliding Speed. Archives of Metallurgy and Materials. 2017;62(3):1787-93.
48. **Samir K. Pal** KD, Anup K. Tripathi. A Study on Performance and Utilization of Surface Miners in Indian Opencast Mines. International Journal of Earth Sciences and Engineering. 2017;10(5):1-8.
49. **Samir K. Pal** AKT, Susmita Panda. Field Application of Gravity Blind Backfilling Method to Abandoned Underground Waterlogged Coal Mine. International Journal of Earth Sciences and Engineering. 2017;10(2):214-21.
50. P. Prabhakaran RR, V. Muthu Kumar, R. Rajasekar, L. Deva Kumar, **Samir Kumar Pal**. Review on Parameters Influencing the Rice Breakage and Rubber Roll Wear in Sheller. Archives of Metallurgy and Materials. 2017;62(3):1875-80.
51. M. Harikrishna Kumar SS, R. Rajasekar, **S. K. Pal**, P. Sathish Kumar. Partial Replacement of Carbon Black by Nanoclay in Butyl Rubber Compounds for Tubeless Tires. Materials Testing. 2017;59(11-12):1054-60.

52. K. Kathirvel RR, T. Shanmuharajan, **Samir Kumar Pal**, P. Sathish Kumar, J. Saravana Kumar. Development of Calcium Titanium Oxide Coated Silicon Solar Cells for Enhanced Voltage Generation Capacity. Materials Science-Poland. 2017;35(1):181-7.
53. C. Moganapriya RR, K. Ponappa, R. Karthick, R. Venkatesh, P. Sathish Kumar, **Samir Kumar Pal**. Tribomechanical Behavior of TiCN/TiAlN/WC-C Multilayer Film on Cutting Tool Inserts for Machining. Materials Testing. 2017;59(7-8):703-7.
54. Aditya Somani TKN, **Samir Kumar Pal**, Arun Kumar Majumder. Pre-Treatment of Rocks Prior to Comminution–A Critical Review of Present Practices. International Journal of Mining Science and Technology. 2017;27(2):339-48.
55. Mohan Kumar RP, P. Sathish Kumar, **Samir Kumar Pal**, M. Mohan Prasath, V. Krishnaraj, R. Rajasekar. Effects of Abaca Fiber Reinforcement on the Dynamic Mechanical Behavior of Vinyl Ester Composites. Materials Testing. 2017;59(6):555-62.
56. Susmita Panda **SKP**, P. V. S. N. Murthy. Evaluation of Pre-Jamming Indication Parameter during Blind Backfilling Technique. Journal of Sustainable Mining. 2016;15(3):100-7.
57. S. K. **Pal SK**M, S. Panda, A. K. Tripathi. Model Studies on the Efficiency of Gravity Blind Backfilling Method and Evaluation of a Pre-Jamming Indication Parameter. International Journal of Earth Sciences and Engineering. 2016:1474-9.
58. Rani S, Prusty BK, **Pal SK**. Journal of Unconventional Oil and Gas Resources. 2016.
59. Panda S, **Pal S**, Murthy P. Journal of Sustainable Mining. 2016.
60. Majumder M, More P, Chatterjee S, Mandley P, **Pal S**. Roll separating force in hot rolling under grooved rolls–A finite element analysis and experimental validation. 2016.
61. Sneha Rani BKP, **Samir Kumar Pal**. Comparison of Void Volume for Volumetric Adsorption Studies on Shales from India. Journal of Natural Gas Science and Engineering. 2015;26:725-9.
62. Sneha Rani BKP, **Samir Kumar Pal**. Methane Adsorption and Pore Characterization of Indian Shale Samples. Journal of Unconventional Oil and Gas Resources. 2015;11:1-10.
63. **S. K. Pal** PK, A. K. Tripathi. Improving the Productivity of Bord and Pillar Panel by Side Discharge Loader in Indian Coal Mines. Transactions of Mining, Geological and Metallurgical Institute of India. 2015;112:1-13.
64. Susmita Panda **SKP**, P. V. S. N. Murthy. Slurry Feeding to Avoid Ground Subsidence. Civil Engineering Systems and Sustainable Innovations. 2014(ISBN: 978-93-83083-78-7):343-7.
65. Sudipta Bhattacharjee DD, **Samir Kumar Pal**. Wireless Sensor Network for Monitoring of Roof Vibration in Mines. LAP LAMBERT Academic Publishing; 2014.
66. K. V. Maheshkumar KK, **Samir Kumar Pal**, P. Sathish Kumar, S. Sahoo, E. Uddin, R. Rajasekar. Research Updates on Graphene Oxide-based Polymeric Nanocomposites. Polymer Composites. 2014;35(12):2297-310.

67. **Samir K. Pal** RK, Anup K. Tripathi. A Study on Loose Material Filled PVC Props as an Alternative to Conventional Wooden Supports. Transactions of Mining, Geological and Metallurgical Institute of India. 2013;110:13-22.
68. B. K. Prusty SR, **S. K. Pal**, A. K. Patra. Gas Shale as a Source of Energy - An Overview. Indian Journal of Power and River Valley Development. 2013;63(11-12):173-8.
69. Sudipta Bhattacharjee DD, **Samir Kumar Pal**. Analysis of roof vibration patterns for identifying fractured rock strata in a coal mine. Journal of Mines, Metals & Fuels. 2012;60(3 & 4):47-53.
70. Sudipta Bhattacharjee DD, **Samir Kumar Pal**, editor Real-Time Roof Health Status Monitoring System in Depillaring Section of a Bord & Pillar Coal Mine Using Multi-hop Wireless Sensor Network (MWSN). ISRM Regional Symposium - 7th Asian Rock Mechanics Symposium; 2012: International Society for Rock Mechanics and Rock Engineering.
71. Subir K. Ghosh BN, K. U. M. Rao, **Samir K. Pal**. Rock sample characterization based on textural features, strength properties and signal emission levels under application of uniaxial compressive stress. International Journal of Engineering Research and Technology. 2012;1(6):ISSN: 2278-0181.
72. S. Bhattarjee DD, **Samir K. Pal**. Performance of Piezo-Electric Sensor for the Monitoring of Roof Fall Hazard in Underground Coal Mine. International Journal of Multi-Disciplinary Research and Advances in Engineering. 2012;4(3):31-42.
73. Naga Ramesh Vanapalli SKG, **Samir K. Pal**, A. K. Tripathi. Studies of Vibrations in the Machine during Drilling. Transactions of Mining, Geological and Metallurgical Institute of India. 2012;109:25-32.
74. Kaushik **Pal SK**P, Chapal K. Das, Jin Kuk Kim. Effect of fillers on morphological and wear characteristics of NR/HSR blends with E-glass fiber. Materials & Design. 2012;35:863-72.
75. Dey N, **Pal S**. A look into miners' health in prevailing ambience of underground coal mine environment. Journal of The Institution of Engineers (India): Series D. 2012;93:37-42.
76. Choudhury L, Parvin T, Khan M, **Pal S**. A Simple and Efficient Method for the Facile Access of Highly Functionalized Pyridines and Their Fluorescence Property Studies. 2012.
77. Anup K. Tripathi JB, **Samir Kumar Pal**. Postmining soil development on spreader reclaimed land for agricultural purpose in Rheinish lignite area, Germany. Journal of Mines, Metals & Fuels. 2012;60(5):103-8.
78. Anup K. Tripathi JB, **Samir K. Pal**. Reclamation and management of disturbed surface mining areas for agricultural purpose with emphasis on concurrent reclamation. Journal of Mines, Metals & Fuels. 2012;60(3-4):54-9.
79. Tripathi A, Bhattacharya J, **Pal S**. Forestry reclamation of disturbed surface mine lands. 2011.

80. Subir Kumar Ghosh SB, K. U. M. Rao, D. Deb, S. K. Pal. Underground coal mine instrumentation using electromagnetic sensors for roof health monitoring and fall prediction. International journal of Earth Sciences and Engineering. 2011;4(2):328-35.
81. **Samir K. Pal** TKP, A. K. Tripathi. A Study on Selection of Pertinent Cross-Sectional Areas for Underground Supports. Journal of Mines, Metals & Fuels. 2011;59(3-4):116-22.
82. **Samir K. Pal SK**M, A. K. Tripathi. Laboratory studies on stabilization of old, abandoned and waterlogged underground workings. Journal of Mines, Metals & Fuels. 2011;59(5-6):150-4.
83. **Samir K. Pal** KD, Subhash C. Niyogi, Anup K. Tripathi. An investigation on operational characteristics of surface miners. Transactions of Mining, Geological and Metallurgical Institute of India. 2011;108:70-6.
84. **Samir K. Pal** AJ, Anup K.Tripathi. Laboratory studies on hydraulic breakage of coal. Journal of Mines, Metals & Fuels. 2011;59(1-2):1-6.
85. Pal K, **Pal S**. SENSOR BASED CHARACTERIZATION OF WELD QUALITY AND PROCESS STABILITY MONITORING IN PULSED MIG WELDING. Journal of Mechatronics and Intelligent Manufacturing. 2011;2(1/2):5.
86. Naga Ramesh Vanapalli SKG, **Samir K. Pal**, Anup K. Tripathi. Vibration and Acoustic Emission Studies of Rock Samples under Uniaxial Compression and Tension. Transactions of Mining, Geological and Metallurgical Institute of India. 2011;108:60-9.
87. Kaushik Pal CKD, Jin Kuk Kim, **Samir Kumar Pal**. Elastomeric Nanocomposites for Tyre Applications. Recent Advances in Elastomeric Nanocomposites: Springer Berlin Heidelberg; 2011. p. 201-31.
88. Anup K. Tripathi **SKP**. Fault Analysis of Mine power Distribution System. Journal of Minetech. 2011;32(2):3-15.
89. Anup K. Tripathi JB, **Samir K. Pal**. Study of Soil Parameters for Successful Reclamation of Disturbed Surface Mine Land in Rhenish Lignite Area, Germany. Minetech. 2011;32(2):3-12.
90. K. Tripathi **SKP**, P. K. Kar. Repairing Techniques for Trailing Cables of Mobile Underground Mining Equipment. Journal of Mines, Metals & Fuels. 2011;59(3-4):123-30.
91. **Samir Kumar Pal** SKM, Susmita Panda, Anup Kumar Tripathi, editor Studies on gravity blind backfilling for ground stabilization above abandoned underground mines. Korean Society for Rock Mechanics Conference and Seminar Book; 2010: Korean Society for Rock Mechanics.
92. **Samir Kumar Pal** BKP, A. K. Tripathi. Air Permeability Studies of Surface Soils over In Situ Coal-Seam Fire Areas in Jharia Coalfield. Transactions of Mining, Geological and Metallurgical Institute of India. 2010;107:17-26.
93. **Samir Kumar Pal** AKK, A. K.Tripathi. A Study on Correlation between P-Wave Velocity, Number of Joints and Schmidt Hammer Rebound Number. Transactions of Mining, Geological and Metallurgical Institute of India. 2010;107:27-33.

94. **Samir K. Pal** BS, Anup K. Tripathi. Studies on gas permeability of sandstone. Journal of Mines Metals & Fuels. 2010;58(6):168-76.

95. **S. K. Pal** DG, A. K. Tripathi. An Experimental Study on Variations of Power Consumption and Cutting Resistance of Coal Using Shearer Drum Model. Transactions of Mining, Geological and Metallurgical Institute of India. 2010;107:34-44.

96. S. Chatterjee AB, B. Samanta, **S. K. Pal**. Image-based quality monitoring system of limestone ore grades. Journal of Computers in Industry. 2010;61(5):391-408.

97. Kaushik Pal **SKP**, Chapal K. Das, Jin Kuk Kim. Influence of fillers on NR/SBR/XNBR blends. Morphology and wear. Tribology International. 2010;43(8):1542-50.

98. Kaushik Pal **SKP**, C. K. Das, Jin Kuk Kim. Relationship between normal load and dynamic co-efficient of friction on rock-rubber wear mechanism. Journal of Materials & Design. 2010;31(10):4792-9.

99. Kaushik Pal **SKP**, Chapal K. Das, Jin Kuk Kim. Effect of fillers on morphological properties and wear characteristics of XNBR/NR blends. Journal of Applied Polymer Science. 2010;120(2):710-8.

100. Kaushik Pal RR, Dong Jin Kang, Zhen Xiu Zhang, **Samir K. Pal**, Chapal K. Das, Jin Kuk Kim. Effect of fillers on natural rubber/high styrene rubber blends with nano silica: morphology and wear. Journal of Materials & Design. 2010;31(2):667-86.

101. Kaushik Pal RR, Dong Jin Kang, Zhen Xiu Zhang, **Samir K. Pal**, Jin Kuk Kim, Chapal K. Das. Effect of fillers and nitrile blended PVC on natural rubber/high styrene rubber with nanosilica blends: morphology and wear. Journal of Materials & Design. 2010;31(1):25-34.

102. Kaushik Pal RR, Dong Jin Kang, Zhen Xiu Zhang, **Samir K. Pal**, Chapal K. Das, Jin Kuk Kim. Influence of carbon blacks on butadiene rubber/high styrene rubber/natural rubber with nanosilica: morphology and wear. Journal of Materials & Design. 2010;31(3):1156-64.

103. Kaushik Pal RR, Dong Jin Kang, Zhen Xiu Zhang, **Samir K. Pal**, Chapal K. Das, Jin Kuk Kim. Effect of filler and urethane rubber on NR/BR with nanosilica: morphology and wear. Journal of Thermoplastic Composite Materials. 2010;23(5):717-39.

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properties of HDPE and LDPE nanocomposites", International Conference on Fascinating Advancements in Mechanical Engineering (FAME 2016), Mepco Schlenk Engineering College (Autonomous), Sivakasi, Tamilnadu, 18th and 19th March 2016.

23. M. Harikrishna Kumar, S. Shankar, P. Sathish Kumar, S. K. Pal, J. Naveen, R. Rajasekar, "Effect of Cloisite 30B on IIR matrix in presence and absence of compatibilizer", International Conference on Fascinating Advancements in Mechanical Engineering (FAME 2016), Mepco Schlenk Engineering College (Autonomous), Sivakasi, Tamilnadu, 18th and 19th March 2016.

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1. Palaniappan SK, Rathanasamy R, Chinnasamy M, **Pal SK**, Jaganathan SK. Utilization of green solvents for synthesis of biodiesel. Green Sustainable Process for Chemical and Environmental Engineering and Science: Elsevier; 2023. p. 1-16.
2. Chinnasamy M, Rathnasamy R, Mohankumar HK, Thangamuthu M, **Pal SK**. Green composite—Fabrication, characterization, evaluation, and application. Green Sustainable Process for Chemical and Environmental Engineering and Science: Elsevier; 2022. p. 1-21.

3. Chinnasamy M, Rathanasamy R, Selvam S, Mohankumar HK, Anandraj M, **Pal SK**. Biosurfactant as biostimulant: Factors responsible for plant growth promotions. Applications of Biosurfactant in Agriculture: Academic Press; 2022. p. 45-68.
4. Palaniappan SK, Chinnasamy M, Rathanasamy R, **Pal SK**. Recycling of Solar Panels. Materials for Solar Energy Conversion: Materials, Methods and Applications. 2021:47-86.
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7. Palaniappan SK, Chinnasamy M, Rathanasamy R, **Pal SK**. Self-Healing Polymer Coatings. Polymer Coatings: Technology and Applications. 2020:319-31.
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10. P. Sathish Kumar **SKP**, T. K. Kannan, R. Rajasekar. Graphene-based Composites: Present, Past and Future for Supercapacitors. Electrochemical Capacitors: Theory, Materials and Applications. 2018;26:263-87.
11. C. Moganapriya PSK, **Samir Kumar Pal**, P. Kanagarajan, R. Rajasekar. Electrochemical Super Capacitors Fabricated by the Layer-by-Layer (LbL) Technique. Electrochemical Capacitors: Theory, Materials and Applications. 2018;26:236-62.
12. P. Sathish Kumar SMS, **Samir Kumar Pal**, R. Rajasekar. Organic/Montmorillonite Nanocomposite Membranes. Organic-Inorganic Composite Polymer Electrolyte Membranes: Preparation, Properties and Fuel Cell Applications: Springer Science, UK; 2017. p. 133-64.
13. P. Sathish Kumar RR, **Samir Kumar Pal**, Ganesh Chandra Nayak, S. Syed Mohammed Reffai. Paints and Coating of Multicomponent Product. Multicomponent Polymeric Materials: Springer Science and Business Media B.V.; 2016. p. 157-226.
14. P. Sathish Kumar **SKP**, C. Moganapriya, R. Rajasekar. Organic/Silica Nanocomposite Membranes. Organic-Inorganic Composite Polymer Electrolyte Membranes: Preparation, Properties and Fuel Cell Applications: Springer Science, UK; 2017. p. 47-72.

BOOK

1. Sudipta Bhattacharjee, Debasis Deb, Samir Kumar Pal, 'Wireless Sensor Network for Monitoring of Roof Vibration in Mines', LAP LAMBERT Academic Publishing, 2014.

List of Sponsored Projects: **Completed: 16**

Completed Sponsored Projects:

1. 'Development of rubber compound and repair techniques for trailing cables of underground mining machines', sponsored by Coal India Limited, Duration: 2013 - 2016, Funding: Rs. 187.84 lakh.
2. 'Studies on shrinkage swelling characteristics of some Indian coals to ascertain recoverability of CBM from deep-seated coal and shale resources', sponsored by Coal India Limited, Duration: 2013 - 2015, Funding: Rs. 126.90 lakh.
3. 'Investigation on augmentation of life of dump-truck tyres through the improvement of tyre retreading compound and development of an optimum road maintenance management system - Phase II', sponsored by Coal India Limited, Duration: 2011 - 2013, Funding: Rs. 53.28 lakh.
4. 'Green house gas recovery from coal mines and unmineable coal beds and conservation to energy', sponsored by EU Contribution, Imperial College, Royal School of Mines, London, Duration: 2011 – 2015, Funding: Rs. 116.40 lakh.
5. 'An investigation on adsorption characteristics of Indian coals and to ascertain recoverability of CBM from deep-seated coal and lignite resources', sponsored by Coal India Limited, Duration: 2010 - 2012, Funding: Rs. 90.07 lakh.
6. 'Development of roof fall prediction system for underground mines using wireless network', sponsored by Coal India Limited, Duration: 2008 - 2011, Funding: Rs. 216.98 lakh.
7. 'Investigation on augmentation of the life of dump-truck tyres through the improvement of tyre retreading compound and development of an optimum road maintenance management system', sponsored by Coal India Limited, Duration: 2005 - 2009, Funding: Rs. 148.69 lakh.
8. Re-application of the S&T project 'Model studies on the efficiency of gravity blind backfilling method and evaluation of a pre-jamming indication parameter in the field', sponsored by Coal S&T, Ministry of Coal, Duration: 2008 - 2011, Funding: Rs. 402.66 lakh.
9. 'Model studies on the efficiency of gravity blind backfilling method and evaluation of a pre-jamming indication parameter', sponsored by Coal S&T, Ministry of Coal, Duration: 2005 - 2007, Funding: Rs. 14.76 lakh.
10. 'Application of high precision satellite imaging and DGPS technology for online, wide-area subsidence monitoring study in Raniganj Area, Eastern Coalfields Limited', sponsored by Coal India Limited, Duration: 2005 - 2008, Funding: Rs. 240.00 lakh.
11. 'Laboratory studies on permeability and sealing efficiency of surface blanketing materials on fire areas', sponsored by Ministry of Steel, Mines and Coal, Duration: 3 years, Funding: Rs. 0.675 lakh. (Co-Investigator).
12. Development of an indigenous blast vibration monitoring seismograph for mining industry' sponsored by MHRD, Duration: 2016 – till date, Funding: Rs. 130.00 lakh.
13. Blind backfilling of unapproachable underground mine workings/voids using suitable mix of fill material and method of filling, sponsored by TATA Steel Limited, Duration: 2018 – 31-12-2021, Funding: Rs. 30.37 lakh
14. 'Bridge project on assessment of coal bed methane and shale gas reservoir quantify' sponsored by EU Contribution, Imperial College, Royal School of Mines, London, Duration: 2016 – till date, Funding: Rs. 53.63 lakh.
15. 'Effect of pore structure of Indian gas shales on its methane and CO2 behaviour' sponsored by ONGC, Duration: 2016 – till date, Funding: Rs. 108.56 lakh.
16. Development of a real-time remote-access blast vibration monitoring cum danger warning system and selection of structure-specific damage criteria, sponsored by MHRD & Uttam Blastech Pvt. Ltd., Duration: 2018 – 2021, Budget: Rs. 107.90 lakh.

List of Consultancy Projects: **Completed: 76, In-Progress: 15**

Completed Consultancy Projects:

1. 'Field trial of hydro-pneumatic stowing' sponsored jointly by ECL and CMPDIL, Duration: 1999 - 2001, Budget: Rs. 10.00 lakh.
2. 'Scientific study regarding stabilization of workings of upper Kajora (R-IX) seam beneath and within 45m of Andal - Sainthia railway line of Eastern railway between railway stations Kajoragram and Siduli in the leasehold Khas Kajora Colliery of M/s Eastern Coalfields Limited', sponsored by ECL, Duration: April 2017 – July 2017, Budget: Rs. 3.25 lakh.
3. 'Techno-economics and mine planning for CSM application', sponsored by Wirtgen India Pvt. Ltd., Duration: 2015 - 2016, Budget: Rs. 15.00 lakh.
4. 'Scientific study of the method of working in R-VIIIT2 seam of Bankola area', sponsored by ECL, Duration: August 2016 – December 2016, Budget: Rs. 6.50 lakh.
5. 'Study on surface miner productivity', sponsored by Wirtgen India Pvt., Duration: May 2016 – December 2016, Budget: Rs. 1.25 lakh.
6. 'Scientific study on the fault area occurred in Longwall Panel-1 (Phase-II) at a distance of 1040m from longwall face installation chamber', sponsored by ECL, Duration: January 2017 – May 2017, Budget: Rs. 7.25 lakh.
7. 'Conducting scientific study into the incidence of subsidence', sponsored by SECL, Duration: June 2016 – August 2016, Budget: Rs. 8.25 lakh.
8. 'Physico-mechanical properties of Panchpatmali Bauxite Deposit', sponsored by M/s National Aluminium Company Limited, Bhubaneswar, Orissa in the year 1981.
9. 'Ventilation planning of Bijuri Colliery', sponsored by Coal India Limited in the year 1985.
10. 'Physical properties of Bauxite ores', sponsored by MECON India.
11. 'Review of the pumping system of Mosabani Mines', sponsored by Hindustan Copper Limited.
12. 'Design modification of the backfilling system design at Mosabani Mines', sponsored by HCL in the year 1991.
13. 'Theoretical and experimental studies on stabilization of inaccessible mine workings', sponsored by CMPDIL, Asansol, and ECL.
14. 'Experimental studies of filling of inaccessible water-logged mine workings by sand-water slurry pumping', sponsored by CMPDIL, Asansol, and ECL.
15. 'Permeability of rock samples', sponsored by UCIL, Jaduguda in the year 2001.
16. 'Rock testing and numerical modeling for stope design at Bangur Chromite Mines', sponsored by Mining Research Cell, IBM, Nagpur in the year 2004.
17. 'Stability analysis of tailings dam of Sukinda Chromite Mines', sponsored by Tata Steel.
18. 'Triaxial and Brazilian tests of the rock sample of Nuclear Power Corporation of India Ltd. – Rajasthan', sponsored by G.I.E.M. India Ltd., Kolkata in the year 2004.
19. 'Solid rock density tests of granite samples used in breakwater construction at Ennore Port', sponsored by Ennore Port Limited in the year 2004.
20. 'Sealed-off area monitoring by video photography at Kunustoria Colliery', sponsored by Eastern Coalfields Limited, Kunustoria Colliery, Burdwan, Duration: June 2010 – August 2010, Budget: Rs. 1.87 lakh.
21. 'Study on impact of surface development on underground coal mines in Durgapur and Asansol sub-divisions in Burdwan district' Duration: May 2010 – October 2010, Budget: Rs. 9.40 lakh.
22. 'Performance testing of VOD measuring instrument', sponsored by UTTAM Blastech Pvt. Ltd., Churcha, Duration: July 2016 – August 2016, Budget: Rs. 1.28 lakh.

23. 'Development of torsion measuring apparatus', sponsored by GE Power India Ltd., Charcha, Duration: September 2016 – December 2016, Budget: Rs. 4.60 lakh.

24. 'Conducting technical study of tailing dumps and waste dumps for short and long term stability in Sukinda Chromite Mine', sponsored by M/s TATA Steel Ltd, Orissa, Duration: February 2018 – March 2018, Budget: Rs. 17.70 lakh.

25. 'Evaluation of a report prepared by M/s Mythcon on NDT of an old building', sponsored by Mythcon, Kolkata, Duration: November 2017 – December 2017, Budget: Rs. 1.60 lakh.

26. 'Testing of borehole cores', sponsored by CMPDI-Ranchi, Duration: 2016 – 2018, Budget: Rs. 30.25 lakh.

27. 'Strata monitoring in CM panel of MIC unit', sponsored by ECL, Duration: May 2016 – December 2016, Budget: Rs. 6.88 lakh.

28. 'Scientific study for design of gallery dimension and support for galleries driven below and within 45m of G.T. Road (NH-2) in R-VIII T seam of Central Kajora Colliery', sponsored by ECL, Duration: January 2018 – March 2018, Budget: Rs. 1.42 lakh.

29. 'Compression testing of insulator', sponsored by GE Power India Ltd., Duration: 2017 – 2018, Budget: Rs. 0.58 lakh.

30. 'Study on strata control, instrumentation, monitoring, analysis etc. of Sub-Panel-1 of 85 level East panel in Seam V of Churcha mine', sponsored by SECL, Duration: 2016 – 2018, Budget: Rs. 17.94 lakh.

31. 'Determination of RMR, 11 sites at MIC (Panel No: 9A, 9B, 13, 17, 17A, 18, 19, 20, 21, -18L & -22L) & 02 Sites at 3 & 4 unit (13 cross dip of RVIIA & 19 cross dip of RVII) of Jhanjra Project Colliery, **(ORLC)**", sponsored by ECL, Duration: 2017 – 2018, Budget: Rs. 6.85 lakh.

32. 'Conducting scientific study on suitable method to safely cross the fault zone, strata monitoring etc. in Longwall Panel-2 at MIC unit of Jhanjra Project Colliery, Jhanjra Area', sponsored by ECL, Duration: 2017 – 2018, Budget: Rs. 8.95 lakh.

33. 'Conducting scientific study to determine the extent of fire and to quenching the same as preventive measure to protect the Eastern Railway Mainline', sponsored by ECL, Duration: 2017 – 2018, Budget: Rs. 12.00 lakh.

34. 'Determination of RMR of Kenda seam at collieries', sponsored by ECL, Duration: 2018, Budget: Rs. 0.70 lakh.

35. 'Conducting technical study of tailing dumps and waste dumps for short and long term stability in Sukinda Chromite Mine'**(CWSC)**, sponsored by M/s TATA Steel Limited, Duration: 2018, Budget: Rs. 17.70 lakh.

36. 'Scientific study for dealing fire which exists in under-ground developed galleries (developed by U/G mining method) of Seam-III of Chirimiri OCM '(**UGMS**), sponsored by ECL, Duration: 2018, budget: 17.64 lakh.

37. Troubleshooting and annual maintenance of adsorption isotherm setup, **(TAAM)**', sponsored by CMPDI, Duration: 2017 – 2018, Budget: Rs. 8.63 lakh

38. 'Effect of depillaring by CM on permanent galleries like travelling roadways, haulage, belt roadways and impact of barrier pillar of overlaying seams on depillaring operation by continuous miner near/adjacent to the depillaring panel at Bankola Area' (**DFGA**), sponsored by ECL, Duration: 2018, Budget: Rs. 5.07 lakh.

39. 'Study of physico-mechanical properties of rocks of Shunuri and Lalganj blocks' (**SPRS**), sponsored by CMPDI-Bhubaneswar, Duration: 2018-2019.

40. 'Scientific study on basement seepage at south city residential complex, Kolkata' (**SSCR**), sponsored by South City Apartment Owners Association, Duration: 2018-2019, Budget: Rs. 15.10 lakh.

41. 'Scientific study on geo-technical assessment of RVI Seam of Jhanjra block, Jhanjra Project Colliery' (**GARP**), Jhanjra Area, sponsored by ECL, Duration: January 2019 – December 2019, Budget: Rs. 7.89 lakh.

42. 'Scientific study of Umaria, Piparia, Pinoura (depillaring panel) and Nowrozabad (W) U/G coal mines of Johilla Area of M/s SECL' (**ISPC**), sponsored by SECL, Duration: January 2019 – April 2019, Budget: Rs. 19.80 lakh.

43. 'Study to assess stability for an unstable part of NH-2 bypass near Dalmia under the jurisdiction of Salanpur Area of ECL for implementation of Raniganj Master Plan' (**SDER**), sponsored by ECL, Duration: February 2019 – June 2019, Budget: Rs. 46.46 lakh.

44. 'RMR Determination at 4 Locations at the Mines of Kenda Area ECL (**LMKE**)', sponsored by ECL, Kenda Area, Duration: Oct 2019- Dec 2019, Budget: Rs. 3.71 lakh.

45. 'Conducting scientific study on suitable method to safely cross the fault zone, strata monitoring etc., in longwall panel-ii at mic unit of Jhanjra project colliery, Jhanjra Area (**SSSF**)', sponsored by ECL, Kenda Area, Duration: August 2017- Nov 2017, Budget: Rs. 8.95 lakh.

46. 'Conducting scientific study and monitoring the behaviour of Dolerite Sill'(**CSMB**), sponsored by SECL, Charcha Mine, Duration: 2018 – 2020, Budget: Rs. 53.50 lakh

47. Vetting of pile testing work (**VPTW**)', sponsored by MYTHCON, Kolkata, Duration: 2018-2019, Budget: Rs. 1.20 lakh.

48. Assessment on Stability and to Suggest Protective Measures alongwith Certification for Permanent Stabilization of Existing RatibatiColliery DB Road Approx. 550m in Length from Ratibati Agent Office to Ratibati MTI under Satgram Area of ECL forImplementation of Raniganj Master Plan (**RCDB**)', sponsored by ECL Sanctoria, Duration: Oct 2019- Feb 2020, Budget: Rs. 17.70 lakh.

49. 'Determination of RMR for 8 Nos. Districts at Kajora Area, ECL (**ASPS**)', sponsored by ECL, Duration: Nov 2019- Feb 2020, Budget: Rs.11.80 lakh.

50. 'Scientific Study to Assess the Stability of Panel-17 of Patmohna Colliery, Sodepur Area, ECL' **(AP17)**, sponsored by ECL, Duration: February 2020 to June 2020, Budget: Rs.722750/- lakh.

51. 'Scientific Study for Support Design of Immediate Roof of Coal Seam IX, Murparug, Umrer Area (**SDIR**)', sponsored by WCL Nagpur, Duration: January 2020- April 2020, Budget: Rs. 9.99 lakh.

52. 'Scientific Study of Chora 7 and 9 Pits Colliery to Comply with Condition of Permission of DGMS **(DGMS)**', sponsored by ECL, Duration: 25-06-2020to 25-09-2020, Budget: Rs. 5.1625 lakh.

53. "Scientific Study for Determination of RMR at Parbelia Colliery under Sodepur Area", **(SDCS)**, sponsored by ECL, Duration: 29-12-2020 to 31-12-2021, Budget: Rs. 177000.00

54. "Work for Carry out Geo-technical Testing and Preparation of Geo-technical Study Report for Pachwara South Coal Block in Dumka dist, Jharkhand", **(WPSP)**, sponsored by United Exploration India Pvt. Ltd, Duration: 22-01-2020 to 30-11-2020, Budget: Rs. 185555.00

55. "Investigation/Scientific Study for Controlled Blasting in u/g to Protect Important Surface structure with 100m Cover as well as to Safe Guard u/g Water Body in R-VII Seam at a Parting of more than 67m From R-VI Seam at Pure Searsole Colliery, Satgram Area", **(CWPS)**, sponsored by ECL, Duration: 15-06-2020 to 15-11-2020, Budget: Rs. 885000.00

56. "Determination RMR at New Kenda Colliery (4no. pit) Kenda Area F.C. No.: Other Contract (Safety)/2020-21/152/03 dated 15-05-2020", **(RMRN)**, sponsored by ECL, Duration: 21-06-2020 to 15-07-2020, Budget: Rs. 74340.00

57. "Determination of RMR and SCAMP at Pandveswar Colliery", **(DRPC)**, sponsored by ECL, Duration: 28-08-2020 to 28-02-2021, , Budget: Rs. 926300.00

58. "Scientific Study Determination of RMR at Chinakuri Mine-III under Sodepur Area Ref. No. MGR/CKI III/2020/545 dtd 18.09.2020", **(SDRM)**, sponsored by ECL, Duration: 25-09-2020 to 25-11-2020, Budget: Rs. 147500.00

59. Assessment on Stability and to Suggest Measures/ProtectiveWorks along with Certification Necessary for Permanent Long-term Stabilization of existing Andal-Sitrampur Railway Tracknear Chinchuria Station under Salanpur Area of ECL for Implementation of Raniganj Master Plan **(ENSN)**', sponsored by ECL Sanctoria, Duration: Oct 2019- Dec 2019, Budget: Rs. 88.50 lakh.

60. 'Permanent long-term Stabilization along with certification in complete package for an unsatable stretch of 300 m. NH-2 Bye pass road near Dalmia in connection with implementation of Raniganj Master Plan', **(PRMP)** sponsored by ECL Sanctoria, Duration: 2020, Budget: Rs. 170.04 lakh.

61. 'Scientific study related to 04 zones of Handidhua Colliery **(SRZH)**', sponsored by MCL, Duration: March 2019 – August 2019, Budget: Rs. 79.65 lakh.

62. "Assessment on Stability and to Suggest Measures - Protective Works along with Certification Necessary for Permanent Longterm Stabilization of Existing Howrah-New Delhi, Grand Chord Line Track near Thapar Nagar Station, under Shyampur A Colliery, Mugma Area, ECL, **(SGCS)**", sponsored by ECL, Duration: 24-02-2021 to 24-12-2021, Budget: Rs. 2489800.00

63. "Determination of Parting in between Old Workings of Borachak (R-VIII) Seam and 3rd Top X - Cut, 9L of 14 Dip and 111 of 19Dip of Same Seam", **(RDSX)**, sponsored by ECL, Duration: 26-02-2021 to 26-05-2021, Budget: Rs. 1217100.00

64. "RMR Determination of Khandra Colliery R-VIII Bottom Seam", **(RDKS)**, sponsored by ECL, Duration: 25-02-2021 to 25-04-2021, Budget: Rs. 147500.00

65. "Scientific Study for Determination of Rmr at Dubeswari Colliery under Sodepur Area", **(SSDC)**, sponsored by ECL, Duration: 15-02-2021 to 15-12-2021, Budget: Rs. 1.77 lakh

66. "Scientific Study for Determination of RMR of B.P. Seam and Local-II Seam of Lakhimata Colliery for Depillaring with Sand / Bottom ASH Stowing under REG-112 of C.M.R 2017" **(SDBS)**, sponsored by ECL, Duration: 26-02-2021 to 26-04-2021, Budget: Rs. 2.95 lakh.

67. "Scientific Study on Controlled Blasting in Bonbahal OC Hire Patch as well as CL Jambad Hired OC Patch (Two mines) of Kenda Area Under Regulation 196(3) of CMR 2017 by a Scientific Agency", **(SHTM)**, sponsored by ECL, Duration: 02-02-2021 to 02-05-2021, Budget: Rs. 9.971 lakh.

68. 'Road Diversion Over Back Filled De-Coaled Area and Stability Assessment of Such Road for Permanent use of Persons &Vehicular Traffic **(RCAR)**', sponsored by CESC Limited, Duration: 24-06-2020 to 31-12-2021, Budget: Rs. 44.486 lakh.

69. 'Feasibility study for extracting processed OB/Sand from overburden of Eastern Coalfiled Limited **(FEPO)**,' sponsored by Eastern Coalfields Limited, Duration: 24-03-2021 to 30-03-2022, Budget: Rs. 785880.00.

70. 'Stabilization with all Preparatory Work on Drilling, Supervision, Stabilization, Monitoring the Effectiveness of the Filing Technique and Certification for Long Term Stability with Submission of Report for an Unstable Stretch of Ratibati Colliery DB Road approx.. 550m in Length under Satgram Area of ECL for Implementation of Raniganj Master Plan **(OPSM)**', sponsored by ECL, Duration: 07-07-2020 to 31-12-2022, Budget: Rs. 227.10 lakh. (PI)

71. 'Geotechnical Study Of 25 No Of Rock Core Samples **(GSOS)**', Sponsored by Mineral Exploration and consultancy Limited,The Project Manager, MECL, Rakha Chapri Project, Matridham, Dahigora, Ghatshila, Dist: East Singhbhum, Jharkhand, PIN-832303, Duration: 02-05-2022 to 02-02-2023, Budget: Rs. 4,28,753. (PI)

72. Scientific Study for determination of RMR of Kalimati seam of Lakhimata Colliery for development and depillaring under Reg. 112 of CMR 2017 **(LCDR)**, Sponsored by Eastern Coalfields Limited, Duration: 22-07-2022- 22-02-2023, Budget: Rs. 1,14,460.00

73. "Scientific Study for determination of Degree of Gassiness of Kalimati seam of Lakhimata Colliery under Reg. 133 of CMR 2017 **(SLCC)**", Sponsored by Eastern Coalfields Limited,A Subsidiary of Coal India Ltd., Office of the Agent, Lakhimata Colliery, Mugma Area, Mugma, Dist. Dhanbad (JH), Pin-828204, Duration: 22-07-2022 to 22-02-2023, Budget: Rs. 79,060.00

74. 'PMT UNDER DIFFERENT PARAMETER OF NON-COAL AND COAL CORE SAMPLES **(PDAC)**', Sponsored by Mining Associates Private Limited, Sitarampur, Asansol, Duration: 03-05-2022 to 03-02-2023, Budget: Rs. 21,24,000. (PI)

75. Determination of Compositional Elements (mainly sulfur) of Coal Substance **(DECS),** Sponsored by MEJA URJA NIGAM PRIVATE LIMITED, P.O. Kohdar, Tehsil: Meja, Dist: Prayagraj, Uttar Pradesh 212301, Duration: 19-07-2022- 19-02-2023, Budget: Rs. 3,96,480.00

76. "Scientific Study of use of bottom Ash (of Thermal Plant) for underground stowing purposes in place of sand **(HUSP)",** Sponsoring by Eastern Coalfields Limited, Office of General Manager, Kunustoria Area, Post- Toposi, Dist - Burdwan, W.B. Pin – 713362, Duration: 28-06-2022 to 28-06-2023, Budget: Rs. 9,91,200.00

In-Progress Projects:

77. 'Analysis of Coal Core Samples **(ACCS)**', sponsored by CMPDI Asansol, , Duration: 2019-2023, Budget: 29.50 lakh. (PI)

78. 'Physico-Mechanical Testing of Rock Cores (**PMTR**)', sponsored by CMPDI Bilaspur, Duration: 2019-2023, Budget: 9.00 lakh. (PI)

79. Physico mechanical testing of borehole cores'(**PTBC**), sponsored by CMPDI-Bhubaneswar, Duration: 2017 – 2022, Budget: Rs. 16.00 lakh (PI)

80. 'Stabilization with all preparatory work on drilling, supervision stabilization, monitoring the effectiveness of the filling technique and certification for long-term stability with submission of report for an unstable stretches 150m and 100m in length of Andal Sitarampur railway line near Chinchuria Station under Salanpur area of ECL for implementation of Raniganj master plan **(SPDS)**, sponsored by ECL, Duration: 22-11-2021 to 30-06-2022, Budget: Rs. **3,48,10,000**/- (PI)

81. 'Analysis of Coal, Fly Ash and Bowl Mill Reject etc. **(ACAR)**', sponsored by Various Government and Non-Government Organizations, Duration: 27-09-2018 to 30.06.2023, Budget: **Rs. 3,31,22,600**/- (PI)

82. 'Scientific study for prediction of subsidence and estimation of surface strain values by 3D numerical modelling for RK-6, RK, NT, RK-7, RK-8 and SRP OC II projects of Srirampur Area, SCCL **(SCCL-3)**', sponsored by The Singareni Collieries Company Limited, Duration: 02-02-2022 to 02-07-2022 , Budget: Rs. 13,98,300.00 (CO- PI)

83. 'Scientific study for prediction of subsidence and estimation of surface strain values by 3D numerical modelling for Goleti 1 & 1A incline mine of BPA area, SCCL **(SCCL-2)**', sponsored by The Singareni Collieries Company Limited, Duration: 02-02-2022 to 02-07-2022 , Budget: Rs. 5,90,000 (CO- PI)

84. 'Scientific study for stability of the barrier pillars between GDK No. 5 & GDK No. 11 Incline, GDK No. 5 & RG OCP III and GDK No. 5 and GDK No. 2&2A in respect of the proposed GDK Coal Mine (No 2&2A and 5) of RG-1 Area, SCCL **(SCCL-1)**', sponsored by The Singareni Collieries Company Limited, Duration: 02-02-2022 to 02-05-2022, Budget: Rs. 11,80,000 (CO- PI)

85. 'Scientific Study for the Preparation of SCAMP and Methodology of Depillaring of Non-superimposed Workings of R-VIII Top and R-VIII Bottom Seam No.1 Incline at Bankola Colliery Bankola Area, ECL **(TBSI)**', sponsored by Eastern Coalfields Limited, Duration: 02-09-2021 to 31-03-2022, Budget: Rs. 10,29,550.00 (CO- PI)
86. 'To Determine the Density of Coal **(DDCL)**', sponsored by NTPC Ltd.,A Govt.of India Enterprise, Duration: 06-09-2021 to 31-03-2024, Budget: Rs. 14,16,000.0 0(CO- PI)
87. 'Scientific Study to Determine Bulk Density of Stacked ROM and Crushed Coal and In-situ Density of PBCMP (PBCM)', Sponsored by NTPC Limited,A Govt. of India Enterprise, Duration: 23-09-2021to 31-03-2023, Budget: Rs. 14,16,000 (CO- PI)
88. "Determination of Compositional Elements of Coal Substance-2 **(DOES)**", Sponsoring by Various Organizations, Duration: 08-08-2022 to 08-02-2023, Budget: Rs. 60,794.00
89. "Preparation and Formulation of Scamp for Six Seams in Chasnalla Colliery **(AFSC)",** Sponsoring by Steel Authority of India Ltd.,Collieries Division, Centralized Collieries Contract Cell, 1, Stadium Road, Kulti - 713343, Duration: 08-03-2020 to 15-04-2025, Budget: Rs. 23,89,500 (Co-PI)
90. "Scientific Study on Subsidence Management over CM Panel – 2 of R V seam, Jhanjra Project Colliery, Jhanjra Area. **(MSPA)**", Sponsoring by Eastern Coalfields Limited,Office of the General Manager, Jhanjra Area, Duration: 18-12-2022 to 09-06-2023, Budget : Rs.2,49,570. **(Co-PI)**
91. "Third-party sampling and analysis of coal at the unloading end of Anpara Thermal Power Station. **(TPAP)",** Sponsoring by Uttar Pradesh Rajya Vidyut Utpadan Nigam, Limited,Atps (Anpara), Anpara thermal power station , Anpara, Dist-Sonebhadra 231225, Uttar Pradesh, Duration : 16-03-2023 to 15-07-2025, Budget: Rs. 16,23,39,680.00 **(PI)**

Upcoming Projects:

1. " Work of referee coal sample analysis of washed coal for Mahagenco", Sponsoring by Maharashtra state power Generation Company Limited, Plot No. G-9, Prakashgad, 3rd Floor, Bandra (E), Mumbai – 400 051, Budget: Rs. 59,00,000/-
2. "Stabilization of railway track over Shyampur -A Colliery , Mugma Area, ECL.

HIGHLIGHTS OF CONTRIBUTIONS IN THE AREA OF SPECIALIZATION:

1. Rock-rubber Abrasion

Doctoral Degree research work is on the abrasion of rubber used in mining machinery against rocks of different types. In this area, a significant contribution to Coal India Limited has been done on tyre re-treading and trailing cable repair.

Rock-Rubber Abrasion and its application in Tread compound formulation of Dump Trucks
Designed and fabricated two rock-rubber abrasion testing set-ups. Formulated a rock-rubber compatibility Index for abrasion-resistant applications of rubber in mines. Using the above set-ups abrasion tests on new tread rubber compounds of re-treaded dumper tyres against common mine rocks were done and based on this the newly developed rubber compound for re-treading of dumper tyres are being tested in different mines of Coal India Limited. The final outcome is a reduction in tyre cost per unit tonne of material transported.

2. Roof Fall Prediction in Underground Bord & Pillar Mines

Development of indigenous electronic sensors and their application in solving underground mining problems, especially roof/pillar stress measurement and roof fall prediction etc. Wireless sensors

networking in underground mines was completed for the first time in India at CM -1 panel of Jhanjra Mine, ECL. From the analysed data, it is possible to predict the imminent roof fall in underground depillaring with caving.

Indigenous, low-cost sensors for application in underground mine roof have been designed, fabricated and tested to have performed well at Jhanjra mine of ECL.

Processing of huge data collected by wired and wireless means are analysed to give a pre-fall indication.

3. Mine Stowing - The stowing (backfilling) work of Mosabani was successfully redesigned and it yielded the desired results through the re-routing of pipelines, alteration of pipe parameters, pulp density, and hydraulic gradient. Thus, it caused a reduction in negative pressure zones and the removal of causes of pulsations in flow and frequent pipe jamming.

Blind Backfilling above old, abandoned Mines

Abandoned mine backfilling is a special area in which very little knowledge is available with the mining industry. An innovative contribution in this field by developing and demonstrating a simple gravity backfilling method has been accomplished.
Three projects were focused on techniques for filling the abandoned mines of Raniganj Coalfields with river sand. These were on the principles of blind backfilling through surface boreholes to stabilize the ground above. Three laboratory experimental set-ups were designed, fabricated, and commissioned in order to perform batch testing on a completely transparent simulated model of mine working at the laboratory of the Department of Mining Engineering, IIT Kharagpur during 1997 and 2000 respectively. The experimental works were successful and some empirical models were formulated to optimize the different parameters of filling. The system was tested in the field and was validated for successful implementation. The total experimental work was continuously inspected and monitored by a team of experts from J K Ropeways and experts of CMPDIL, Asansol, headed by Mr. H. B. Ghosh, former DGMS. The team highly appreciated the work and commented the work was a unique one. The empirical relationships developed in laboratory model studies are also being in the field to estimate the extent of filling in different directions. A Coal S&T project has funded the field implementation part of the blind backfilling project. Some important achievements in this project are:

a. A very simple blind backfilling method named as ‘simple gravity backfilling technique’ has been introduced after successful trials in the laboratory. This method was implemented in the field at abandoned Krishnanagar Colliery, where more than 20,000 m3 of sand was deposited underground through five boreholes. More than 5,000 m3 of sand could be filled through one borehole which is a record figure for such type of filling in India.

b. Developed a pre-jamming indicator for blind backfilling in abandoned mines through pressure signature analysis. This pressure signature analysis helps in avoiding the most significant problem in this type of backfilling i.e., the sudden, pre-mature jamming of boreholes.

c. For the first time in the world, an ROV (Remotely Operated Vehicle-mounted) Camera having Sonar Imaging System has been used to prepare 2D maps of the abandoned, water-logged mine and to monitor area coverage during mine filling operation. Another small ROV-mounted camera was also used to show the distribution of filled material inside the water-logged mine.

d. At Krishnanagar Colliery, near Raniganj, W. B. one mobile research laboratory has been designed and used for complete monitoring of blind backfilling process.

A research with Tata Steel Limited was recently completed where appropriate proportions of sand and fly ash were determined for dense-phase backfilling and paste backfilling in underground coal mines.

Dr. Samir K Pal.

Professor & Head

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