Brief Bio-data

1. **Name**: Dr. Santosh Kumar Ray

2. **Date of Birth**: 01.01.1967

3. Current Position and Address
(Include email ID and Contact number)

Chief Scientist and HoS, Mine Fire, Ventilation, Miners' Health Research Group
Room No. TF5, Technological Block, CSIR-CIMFR, Dhanbad
Email: santoshray@cimfr.nic.in santoshray8@gmail.com

4. **Educational qualifications**: (Graduation and above)

Sl. No	Degree/ Certificate	Year of Passing	University/ Institute	Subjects
1	B Sc. Engg. (Mining)	1990	Regional Engineering College [Now NIT] Rourkela	Mining Engineering
2	M. Tech	1993	Institute of Technology [Now IIT, BHU] Varanasi	Mine Planning and Design
3	Ph. D	2013	Indian School of Mines [Now IIT (ISM)], Dhanbad	Mining Engineering

5. Work experience

Designation	Institute/company	From	To	Nature of work
Lecturer	Shri Ramdeobaba Collegeof Engg. and Mgmt, Nagpur	20.11.1991	09.11.1995	Teaching to UG students
Scientist B	CSIR-CIMFR Dhanbad	14.11.1995	13.11.2000	R&D Work
Scientist C	CSIR-CIMFR Dhanbad	14.11.2000	13.11.2004	R&D Work
Scientist E1	CSIR-CIMFR Dhanbad	14.11.2004	13.11.2009	R&D Work
Principal Scientist	CSIR-CIMFR Dhanbad	14.11.2009	13.11.2016	R&D Work
Senior Principal Scientist	CSIR-CIMFR Dhanbad	14.11.2016	13.11.2021	R&D Work
Chief Scientist	CSIR-CIMFR Dhanbad	14.11.2021	Continuing	R&D Work

6. Work Area(s)/ Specialization:

Mine Fire and Explosions, Mine Ventilation, Mine safety, Mine Environment

7. Major Contributions (Max. 100 words):

Developed and standardized an electrochemical method called ***Wet Oxidation Potential Method*** for determining the ***susceptibility of coal to spontaneous heating.*** This method provides reliable and reproducible result even for high moisture coals.

Water mist has been applied to open fire during experimentation in Mine Fire Model Gallery for the first time in India and got encouraging results to control fire.

For the first time in India, efficacy of High pressure high stability nitrogen foam technology has been assessed in Mine Fire Model Gallery in case of open as well as sealed fire. This technology has already started yielding results by way of controlling fires in Jhanjra Colliery, Shyamsunderpur colliery of ECL, Sudamdih Shaft Mine, Lodna Colliery of BCCL, etc.

Formulated guidelines for ventilation in continuous miner (CM) section of underground coal mine.

8. **Number of Research Publications**:

- Papers in Journals: 50
- In conference proceedings: 55
- Invited lectures delivered: 06

List of best 05 publications

(i) S K Ray, M Sarkar and T N Singh "Effect of cyclic loading and strain rate on the mechanical behaviour of sandstone" International Journal of Rock Mechanics and Mining Sciences Vol. 36, No. 4, June 1999, pp. 543-549, Impact factor 6.849, Cited by 202

(ii) S K Ray and R P Singh, "Recent developments and practices to control fire in underground coal mines", Fire Technology, Vol. 43, December 2007, pp 285-300, Impact factor 3.605, Cited by 108

(iii) Santosh Kumar Ray, Durga Charan Panigrahi and Atul Kumar Varma, "An electro- chemical method for determining the susceptibility of Indian coals to spontaneous heating", International Journal of Coal Geology, Vol. 128-129, August 2014, pp 68-80. Impact factor 5.6, Cited by 18

(iv) Santosh Kumar Ray, Niroj Kumar Mohalik, Asfar Mobin Khan, Debashish Mishra, Nikhil Kumar Varma, Jai Krishna Pandey, Pradeep Kumar Singh.(2020) "CFD modeling to study the effect of particle size on dispersion in 20l explosion chamber: An overview", International Journal of Mining Science and Technology, 30 (2020) 321-327, https://doi.org/10.1016/j.ijmst.2020.04.005, Impact factor 11.8, Cited by 20

(v) Santosh Kumar Ray, Asfar Mobin Khan, Niroj Kumar Mohalik, Debashish Mishra, Somu Mandal, Jai Krishna Pandey, "Review of preventive and constructive measures for coal mine explosions: An Indian perspective", International Journal of Mining Science and Technology, 32 (2022) 471-485, https://doi.org/10.1016/j.ijmst.2022.02.001, Impact factor 11.8, Cited by 23

Books/Chapters authored/edited

- Editor, Proceedings of National Seminar on Policies, Statutes & Legislation in Mines, 2008 [POSTALE 2008]
- Member, editorial committee of 9th International Mine Ventilation Congress [IMVC], India, 2009
- Editor, Proceedings of National Conference on Recent Challenges in Mining Industry[RCMI 2018]

9. List of 5 Major Contract R&D Projects:
Grant-in-Aid Project handled as Project Leader (costing more than 1 crore)

Sl No.	Project title	Cost, Rs.	Funding Agency
1	Studies on simulation of open fires in a mine gallery under varied airflow for suppression of fire and explosions in underground coal mines	145.35 lakhs	Ministry of Coal, Govt. of India
2	Development of guideline for prevention & mitigation of explosion hazard by risk assessment and determination of explosibility of Indian coal incorporating risk based mine emergency evacuation and re-entry protocol	796.14 Lakhs	CIL R&D Board (Ongoing)

Sponsored Projects as Project Leader (Costing more than 10 Lakhs)

Sl No.	Project title	Cost, Rs.	Funding Agency
1	Ventilation and fire safety design of three tunnels at Panvel-Karjat double line suburban corridor of Mumbai Railway Vikas Corporation Ltd., Mumbai. (SSP/425/2019-20)	41,30,000/-	Mumbai Rail Vikash Corporation Ltd (MRVC), Mumbai
2	Advice for suitable ventilation design for improvement of ventilation design at Churcha mines (RO) of Baikunthpur Area, SECL (SSP/512/2020-21)	25,48,800/-	General Manager, Baikunthpur Area, SECL
3	Scientific study for formulation of guidelines on ventilation procedures for continuous miner section in RVI seam of Jhanjra Project Colliery, ECL (SSP/61/2015-16)	16,04,104/-	GM, Jhanjra Area, ECL

10. **(a) Name of Patents/Copyrights applied /granted/commercialized:Patents filed & granted** (National & International):

National

Title of Patent Granted	Patent No.
A device useful for uninterrupted flushing of cryogenic inert fluid to control fire in underground mines	2158/DEL/98
A device useful for measuring the flow rate of cryogenic liquids flowing through a tube	215116
A device useful as an automatic pressure neutralization system for control of fire in underground coal mines	215681
A device useful for cooling an individual while working in open cast mines in hot and dry summer	270496
Title of Patent recently filed	Application No
Low temperature air purifier that kills Covid-19 virus for indoor use	202211012041
An adiabatic double cylinder air purifier and use thereof	202211006593

International (US Patent)

Title of Patent	Patent No.
Device useful for measuring the flow rate of cryogenic liquids flowing through a tube	US Patent No. 6,435,041

Copyrights applied

MEMP - Mine Environment Monitoring and Prediction Software 008CR2020	Swades Kumar Chaulya, Santosh Kumar Ray, Debashish Mishra, Girendra Mohan Prasad, Sujit Kumar Mandal, Gautam Banerjee, Pradeep Kumar Singh, Chandan Kumar, Dewangshu Pandit, MitraBarun Mitra and Prasanjit Dey
CIMFR-PSYCHRO 006CR2021	Debashish Mishra, Jai Krishna Pandey, Santosh Kumar Ray, Niroj Kumar Mohalik, Pradeep Kumar Singh, Raj Priyadarshi
FIRE INDICATOR 004CR2021	Debashish Mishra, Santosh Kumar Ray, Jai Krishna Pandey, Niroj Kumar Mohalik, Pradeep Kumar Singh, Raj Priyadarshi
MINE-EXPLO 005CR2021	Santosh Kumar Ray, Debashish Mishra, Jai Krishna Pandey, Niroj Kumar Mohalik, Pradeep Kumar Singh, Raj Priyadarshi
GAS-EXPLO 061CR2022	Santosh Kumar Ray, Debashish Mishra, Niroj Kumar Mohalik, Raj Priyadarshi, Jai Krishna Pandey, Jitendra Pandey, Kumari Anjali

(b) Technologies/Products /knowhow/Services developed:

An Expression of Interest (EoI) has been floated by CSIR-CIMFR for developing product on Automatic Dynamic Balancing of Pressure and MoU will be signed shortly with a party.

11. Honors/Awards/Recognitions/Fellowships/ Scholarships/Professional Membershipsreceived:

Awards

i) MEAI-Sitaram Rungta Memorial Award for the best paper on Mining related issues during the year 2013
ii) D N Thakur award for the year 2010-2011 by Mining Geological & Metallurgical Institute, Kolkata
iii) Awarded by CSIR-CIMFR, (the then CMRI) Dhanbad and presented with citation and a cash prize for contribution to National Filing of Patent in the year 2004-2005
iv) Awarded Second prize for publication in the year 2003-04 by CSIR-CIMFR, (the then CMRI) Dhanbad
v) CSIR - Golden Jubilee CMRI - Whitaker Annual Award in 2002-03 by CSIR-CIMFR, Dhanbad for R&D work in the field of mining and cognate subjects
vi) Awarded by CSIR-CIMFR, (the then CMRI) Dhanbad and presented with citation and a cash prize for contribution to International Filing of Patent in the year 2000
vii) Dr. Rajendra Prasad Memorial Prize in 2016 by The Institution of Engineers (India) for publication of paper in Journal of The Institution of Engineers (India) Series D, Vol 96, Issue 2.
viii) National Geoscience Award 2016 by Ministry of Mines, Government of India. The prestigious award was given by the President of India.
ix) MEAI-Service Excellence Award 2019 for extraordinary services to MEAI and Mineral Industry of India
x) Received INSA (Indian National Science Academy) financial support (Registration Fee) to attend and present a Research paper in Tenth International Mine Ventilation Congress (IMVC) held at Sun City, South Africa
xi) Certificate of Merit and cash prize from MEAI-Monthly Riddle Competition May 2023

Recognition

- ❖ Member Board of Mining Examinations (Coal) at Directorate General of Mines Safety, Dhanbad for a period of three years vide Gazette Notification of Ministry of Labour and Employment, Government of India on 8th October 2020.
- ❖ Scientific work appreciated by Central Coalfields Limited for providing scientific support and advice during reopening and recovery operation of Bhurkunda-B mine sealed due tooccurrence of fire in the month of April 2014 and Churi underground colliery, NK Area in 2022.
- ❖ Controlling fire in a longwall panel (AW1) in RVIIA seam of 1 & 2 Incline mine of Jhanjra Project in Raniganj Coalfields, India was appreciated by CGM, Jhanjra, ECL.
- ❖ The work on scientific investigation and advice for reopening of sealed off Blasting Gallery Panel No. 1, VK7 Incline, SCCL was appreciated by mine management SCCL.
- ❖ Appreciation letter received from General Manager, Pandaveswar Area, ECL for the commendable job done to the problem of spontaneous heating during liquidation of thickRVI coal seam at Khottadih Colliery, ECL.

Details of Professional memberships:

Sl No.	Name of the professional societies	Grade of Membership	Year of Election
1	The Mining, Geological & Metallurgical Institute of India	Life Member	1997-98
2	Computer Society of India	Life Member	August 2004
3	International Society for Rock Mechanics	Life Member	August 2004
4	The Institution of Engineers (India)	Fellow (F1191485)	October 2014
5	The Indian Science Congress Association	Life Member	January 2006
6	IME Journal Readers' Forum	Life Member	August 2005
7	National Institute of Small Mines	Member	2001
8	Mining Engineers' Association of India	Life Member	June 2008
9	Society of Geoscientists and Allied Technologists	Life Member	October 2008
10	Indian Thermal Analysis Society (ITAS)	Life Member	March 2018

12. Societal Contributions

- ➢ Development of state-of-the-art facility for fire and explosion study which includes coal characterisation, combustion study, critical oxidation study, particle size distribution analysis and explosion behaviour
- ➢ As an expert member provided inputs to Board of Mining Examinations (Coal) at Directorate General of Mines Safety, Dhanbad.