

CURRICULUM VITAE (CV)

PERSONAL PROFILE

Name : CHANDRA SEKHAR GAHAN
Date of birth : 22nd January 1980
Gender : Male
Marital status : Married
Nationality : Indian
Languages Known : English, Hindi, Oriya, Korean, Swedish
Passport Number : Z6092872
Skype : csgahan



ADDRESS

Present Address

Professor
Department of Biotechnology,
Guru Ghasidas Vishwavidyalaya,
Bilaspur, Chhattisgarh.
Tel: +91 7976633575
E-mail: gahancsbiometal@gmail.com

Permanent Address

C/O- Dushasan Gahan
At - Koranta, Po - Randiahata,
Dist - Bhadrak, Pin-756135, Odisha, INDIA
Tel: +91- 7976633575

PRESENT EMPLOYMENT DETAILS

Designation	Organization	From	To	Roles and responsibilities
Professor	Department of Biotechnology, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh.	31/08/2023	Till date	Teaching and Research

AREAS OF SPECIALIZATIONS:

Process Design, Process Control Engineering, Bioprocess engineering, Biohydrometallurgy, Applied Microbiology, Sports Biomechanics, Environmental assessment, Waste Recycling, Industrial waste utilization, E-waste management, Sports Biosciences, Chemical Engineering, hydrometallurgy, Metallurgical engineering

CURRENT AREAS OF RESEARCH:

Recycling of Spent petroleum spent catalyst; Recycling of Electronic waste; Biosorption of heavy metals; Zinc sulphide metallurgy; Copper and steel slag recycling; Biooxidation kinetics of Iron and Sulphur oxidizing microorganisms; Bioleaching of metal values from secondary mineral resources.

EDUCATIONAL QUALIFICATION DETAILS

Exam	Specialization	College/Institute	Board/University	Year of	Class/Grade	Percent of
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Passed				Passing		Marks/CGPA
Secondary	Mathematics, Science, Social Studies, Economics, Hindi, English	Sunshine Misssion School, Bhadrak, India	Indian Certificate Secondary Education, India	1996	Second Class	57.3% 344/600
Higher Secondary (+2 Science)	Physics, Chemistry, Biology, Mathematics, Hindi and English	Vyasanagar College, Jajpur Road, Odisha	Council of Higher Secondary Education, Bhubaneswar, Odisha India	1998	Second Class	55.3%
B.Sc Hons.	Zoology (Hons.) Botany and Chemistry	Bhadrak College, Bhadrak, Odisha	Fakir Mohan University, Balasore, Odisha	2001	First class with distinction	68.3%
M.Sc	Applied and Industrial Microbiology	Utkal University, Bhubaneswar, Odisha	Utkal University, Bhubaneswar, Odisha	2003	First Class First (University topper)	79.4%

DETAILS OF DOCTORAL DEGREE

Thesis Title	From	To	College/Institute	University	Name of Supervisor	Degree Awarded Date
Possibilities to use industrial oxidic by-products as neutralizing agent in bioleaching and the effect of chloride on biooxidation	15/02/2006	21/12/2009	Process Metallurgy Division, Department of Chemical Engineering and Geosciences, Lulea University of Technology, Lulea, Sweden.	Lulea University of Technology, Lulea, Sweden.	Prof. Ake Sandstrom	21/12/2009

DETAILS OF THE COURSES STUDIED DURING PhD

Degree	Subject	Courses
PhD Engineering	Process Metallurgy (Bioprocess Technology)	Recent developments in flocculation and dewatering of Mineral dispersions, Hydrometallurgy, High Temperature Materials, High Temperature Processes, Instrumental Analysis: Nuclear magnetic resonance spectroscopy (NMR), Instrumental Analysis: X-Ray diffraction (XRD), Instrumental Analysis: IR-RA-UV-Spectroscopy, Instrumental Analysis: Scanning electron microscopy (SEM), Instrumental Analysis: Inductively coupled plasma-Mass Spectroscopy (ICP-MS), Instrumental Analysis: Thermal Analysis, Research methodology in engineering, Scientific writing in natural and engineering sciences, Review of scientific publications, Assets engineering and management, Performance measurement and management.

DETAILS OF POST-DOCTORAL WORK

Nature of Work	From	To	Name of Institution/Organization
Research on Bioleaching and Chemical leaching of Alum Shale Mineralisation from Myrviken, Sweden	22/12/2009	06/05/2010	Process Metallurgy Division, Department of Chemical Engineering and Geosciences, Lulea University of Technology, Lulea, Sweden.
Modelling of Ferrous iron oxidation at elevated concentration of counter cations (Flouride, Sulphate) of sodium ions in a <i>Leptospirillum</i> dominated chemostat culture.			
Measurement of Diffusion – Reaction Phenomena in the Chloride Heap Leaching of Chalcopyrite	17/05/2010	16/02/2011	Centre for Bioprocess Engineering Research, Department of Chemical Engineering, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa
Population dynamics study during Biooxidation of arsenopyrite in batch bioreactor			

DETAILS OF EMPLOYMENTS / EXPERIENCE (TEACHING & RESEARCH):

Total Experience (Excluding PhD period): 14 Years 08 Months 02 Days

S. No.	Name and Address of Employer	Designation	Pay-Scale & AGP/GP	From	To	Duration	Type of Organization
1.	Department of Biotechnology, Guru Ghasidas Vishwavidyalaya, Bilashpur, Chattisgarh.	Professor	Basic Pay-144200 Pay Matrix-Level 14	31/08/2023	Till Date (Continuing)	0 Year 0 Month 08 Days	Central Government Govt. of India
2.	Department of Environmental Studies, Siksha Bhavan, Visva-Bharati University, Shantiniketan, Bolpur, West Bengal, India	Associate Professor	Basic Pay-131400.00 Pay Matrix-Level 13A	26/05/2023	30/08/2023	0 Year 03 Month 04 Days	Central Government Govt. of India
3.	Department of	Assistant	Basic Pay-	24/12/2021	25/05/2023	01 year	Central

	Microbiology, School of Life Sciences, Central University of Rajasthan, Bandarsindri, N.H.-8, Tehsil, Kishangarh, District Ajmer, Rajasthan, India	Professor	89900.00 Pay Matrix- Level 11 Gross – 154490.00			5 Months 01 Day	Government Govt. of India
4.	Department of Sports Biosciences, School of Sports Sciences, Central University of Rajasthan, Bandarsindri, N.H.-8, Tehsil, Kishangarh, District Ajmer, Rajasthan, India	Associate Professor Head, Dept. of Sports Bioscience, Head, Dept. of Sports Biomechanics, Coordinator, School of Sports Sciences	Basic Pay- 131400.00 Pay Matrix- Level 13A Gross – 212775.00	07/05/2018	23/12/2021	03 Years 07 months 16 days	Central Government Govt. of India
5.	Department of Microbiology, School of Life Sciences, Central University of Rajasthan, Bandarsindri, N.H.-8, Tehsil, Kishangarh, District Ajmer, Rajasthan, India	Assistant Professor	Basic Pay- 75300.00 Pay Matrix- Level 11 Gross – 95433.00	22/08/2013	07/05/2018	4 Years 8 months 15 days	Central Government Govt. of India
6.	Mineral Processing Division, Department of Mining Engineering, Suleyman Demirel University, E-7 Block, 1st Floor, West Campus, Cunur, TR32260, Isparta, TURKEY	Marie Curie Fellow: Experienced Researcher	4167 € (Euro) per month, Marie Curie Fellowship FP7 EU cofounded, TUBITAK Turkey	12/4/2013	16/8/2013	0 Year 4 month 4 days	Central Government, Govt. of Turkey
7.	Department of Biotechnology, SRM University, SRM Nagar Kattankulathur - 603203 Kancheepuram District, Tamilnadu, India.	Assistant Professor	Pay Scale- PB- 3(15600- 39100) AGP-6000 Gross -75000	27/4/2012	04/03/2013	0 Year 10 Months 7 Days	Private

8.	Korea Institute of Geoscience and Mineral Resources (KIGAM), Gwahang-no 124, Yuseong-gu, Daejeon, 305-350, South Korea	Senior Researcher	Basic-1,879,935 Research Pay-974,590 Gross salary-3,459,398 KRW	15/3/2011	25/4/2012	1 Year 1 Month 10 Days	Central Government, Govt. of Republic of Korea
9.	Centre for Bioprocess Engineering Research, Department of Chemical Engineering, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa	Post-Doctoral Research Fellow	11,250 ZAR (South African Rand)	17/05/2010	16/02/2011	0 Year 8 Months 29 Days	Central Govt.
10.	Process Metallurgy Division, Department of Chemical Engineering and Geosciences, Lulea University of Technology Laboratorievagen 14, SE-971 87 LULEA Sweden.	Post-Doctoral Research Fellow	20,000 SEK (Swedish kronnor)	22/12/2009	06/05/2010	0 Year 4 Months 14 Days	Central Govt.
10.	Biomaterial Processing and Biotechnology Department, CSIR- Institute of Minerals and Materials Technology (Formerly Regional Research Laboratory) Council of Scientific & Industrial Research Bhubaneswar - 751 013, Odisha, INDIA	Project Assistant	8000 INR	17/12/2004	6/2/2006	1 Year 1 Month 19 days	Central Government, Govt. of India
10.	Department of Botany, PG Dept. of Botany, Utkal University, Vanivihar,	Guest Faculty	6000 INR	22/12/2003	22/12/2005	2 Years 0 Month	State Govt. Odisha

Bhubaneswar, Odisha.						
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EXAMINER OF Ph.D. Thesis of Universities- 04

1. CSIR IMMT, Bhubaneswar, Odisha, India-1
2. KIIT University, Bhubaneswar, Odisha, India-1
3. Cape Peninsula University, Cape Town, South Africa-2

COURSES TAUGHT

Course No. & Title	Level (UG/PG)	No.
MBY 404 Microbial Physiology	PG (MSc Microbiology & Int. MSc. Microbiology)	1
MBY 404 Bioinstrumentation and Biotechniques	PG (MSc Microbiology & Int. MSc. Microbiology)	1
MBY 704 Bioprocess Engineering	PhD Microbiology	1
MSSB/MSSP/MSSN 101 Human Anatomy and Physiology	PG (MSc Sports Biochemistry/Sports Physiology/Sports Nutrition)	1
MSSB/MSSP/MSSN 102 Sports Biomechanics	PG (MSc Sports Biochemistry/Sports Physiology/Sports Nutrition)	1
MSMB 305 Industrial Microbiology	PG (MSc Microbiology)	1
MSMB 201 Microbial Physiology	PG (MSc Microbiology)	2
MSMB 206 Bioengineering	PG (MSc Microbiology)	1
MSMB 105 Physics Chemistry Statistics for Biologist	PG (MSc Microbiology)	1
MSMB 304 Environmental and Agricultural Microbiology	PG (MSc Microbiology)	2
MSMB 403 Bioprocess Technology and Bioenergy	PG (M.Sc Microbiology)	2
MSMB,MSBT,MSBC 103 Microbiology	PG (MSc Microbiology/Biotech/Biochem)	2
MSMB,MSBT,MSBC 104 Analytical Techniques	PG (MSc Microbiology/Biotech/Biochem)	4
BT066-Environmental Bioremediation Technology	PG (MTech Biotechnology)	1
Paper 1- Microbiology Fundamentals	PG (MSc Applied Microbiology)	1
Paper 2-Microbial Genetics	PG (MSc Applied Microbiology)	1
Paper -7 Environmental food & Industrial Microbiology	PG (MSc Applied Microbiology)	2
Paper -12 Microbial Biotechnology: Fundamentals	PG (MSc Applied Microbiology)	1
Paper -13 Microbial Biotechnology: Applications	PG (MSc Applied Microbiology)	1

RESEARCH PUBLICATIONS:

PAPERS PUBLISHED IN NATIONAL / INTERNATIONAL JOURNALS:

Google Scholar: Citations: 1150 h-index: 14 i10-index: 18
 Cumulative Impact Factor- 119.32; Average Impact Factor – 4.2

Sl. No	Title of the Paper	Author(s)	Name of the Journal	Vol. & Year	Pages
1	Bioleaching of zinc sulfide concentrate in redox controlled fed-batch	N. Nagar, H. Garg, M. Dhaka, C. S. Gahan*	Journal of Sustainable Metallurgy, Q2	Vol. 8 January 2022	333-342

	process compared to redox non-controlled batch process		Springer (IF: 3.068) ISSN: 2199-3831		
2	A study on the biosorption kinetics of Cu (II) and Zn (II) ions from aqueous phase (sulphate medium) using waste sawdust generated from <i>Acacia nilotica</i> wood carpentry	S. Aachhera, S. Tiwari, S. Singh, N. Nagar, H. Garg, C. S. Gahan*	Ecotoxicology, Q2 Springer (IF: 2.935) ISSN: 1573-3017	Vol. 31 Issue 4 May 2022	615-625
3	Comparative biosorption kinetics study of Ni and Zn metal ions from the aqueous phase in sulphate medium by the wooden biomass of <i>Dalbergia sissoo</i>	S. Tiwari, S. Aachhera, H. Garg, M. Rojra, N. Nagar*, C.S. Gahan*	Environmental Quality Management, Q3 Wiley (IF: 1.09) ISSN: 1088-1913	Volume 31, Issue 4, June 2022	63-73
4	Characterization of different types of petroleum refinery spent catalyst followed by microbial mediated leaching of metal values	N. Nagar, H. Garg, C.S. Gahan*	Chemical Reports, SyncSci Publishing Pte Ltd. Singapore ISSN: 2591-7943	Vol. 3 (1), 2021	177-187
5	Effect of pulp density on the bioleaching of metals from petroleum refinery spent catalyst	N. Nagar, H. Garg, N. Sharma, S. A. Awe, C.S. Gahan*	3 Biotech , Q2 Springer (IF: 2.893) ISSN: 2190-572X	Vol. 11, Issue 3, Article 143 (2021)	1-11
6	Bioleaching of waste mobile phone printed circuit board in controlled redox potential compared to non-controlled redox potential	H. Garg, N. Nagar, M. N. Ansari, G. Ellamparuthy, S. I. Angadi, A. Akcil, C. S. Gahan*	International Journal of Environmental Science and Technology, Q2 Springer (IF: 3.519) ISSN: 1735-1472	Volume 17 Issue 6, June 2020,	3165-3176
7	Integrated bio-pyro-hydro-metallurgical approach to recover metal values from petroleum refinery spent catalyst.	N. Nagar, H. Garg, C.S. Gahan*	Biocatalysis and Agricultural Biotechnology, Q2 Elsevier (IF: 3.281) ISSN: 1878-8181	Vol. 20, July 2019	101252
8	Bench scale microbial catalysed leaching of mobile phone PCBs with an increasing pulp density	H. Garg, N. Nagar, G. Ellamparuthy, S. I. Angadi, C.S. Gahan*	Heliyon, Q1 Cell Press (IF: 3.776) ISSN: 2405-8440	Volume 5, Issue 12, December 2019, e02883	1-11
9	Effect of Increasing Concentrations of Chloride, Nitrate and Sulphate Anions with Their Counter Cations of Potassium, Sodium and Ammonium on Sulphur Bio-Oxidation by Sulphur Oxidizing Microorganism	H. Garg, N. Nagar, P. Sharma, J. Kanwar, S. Zaki, C.S. Gahan*	Archives of Petroleum & Environmental Biotechnology, Gavin Publishers (IF: 1.45) ISSN: 2574-7614	6(1) & 2019	147
10	Influence of grinding time on the bioleaching of copper from copper slag.	N. Nagar, H. Garg, S.I. Angadi, C.S. Gahan*	Bioscience Biotechnology Research	12 (2) & 2019	512-522

			Communication, ISSN: 0974-6455		
11	Efficiency Assessment of Pure Fe Oxidizing Microorganisms in Iron Supplemented and Non-Supplemented Medium and Pure S Oxidizing Microorganisms for Bioleaching of Mobile Phone Printed Circuit Boards.	H. Garg, N. Nagar, A. Dash, C.S. Gahan*	Bioscience Biotechnology Research Communication ISSN: 0974-6455	12(2) & 2019	425-434
12	Comparative batch and fed-batch bioleaching of zinc from zinc sulphide concentrate using mixed culture of iron and sulphur oxidizing microorganisms	H. Garg, N. Nagar, S. Behera C.S. Gahan*	"NPI" International Research Journal of Industrial and Environmental Biotechnology (IRJIEB) ISSN: 2581-7906	2(1) & 2019	177-221
13	A Potential Alternative for Precious Metal Recovery from E-waste: Iodine Leaching.	M. Sahin, A. Akcil, C. Erust, S. Altynbek, C. S. Gahan, A. Tuncuk	Separation Science and Technology, Q2 Taylor & Francis (IF: 2.799) ISSN: 0149-6395	50 (1) & 2015	2587-2595
14	Precious Metal Recovery from Waste Printed Circuit Boards using Cyanide and Non-Cyanide Lixiviants - A Review.	A. Akcil, C. Erust, C. S. Gahan, M. Ozgun, M. Sahin, A. Tuncuk	Waste Management, Q1 Elsevier (IF: 8.1) ISSN: 0956-053X	45 (1) & 2015	258-271
15	Studies on the effect of coal particle size on biodepyritization of high sulfur coal in batch bioreactor.	S. Singh, H. Srichandan, A. Pathak, C. S. Gahan, S. Lee, D. J. Kim, B. G. Kim	Polish Journal of Chemical Technology, Q3 De Gruyter Open (IF: 1.115) ISSN: 1509-8117	17 (1) & 2015	97-102
16	Biohydrometallurgy of Secondary Metal Resources: A Potential Alternative Approach for Metal Recovery.	C. Erust, A. Akcil, C.S. Gahan, A. Tuncuk, H. Deveci	Journal of Chemical Technology and Biotechnology, Q2 Wiley (IF: 3.4) ISSN: 0268-2575	88 (12) & 2013	2115-2132
17	Evaluation of Oxidic By-Products as Neutralizing agents in Biooxidation of a Refractory Gold concentrate and their influence on Gold Extraction through Cyanidation.	C.S. Gahan* , J.E. Sundkvist, F. Engström, Å. Sandström	Research Journal of Recent Sciences ISSN: 2277-2502	2(10) & 2013	41-47
18	Quantifying microorganisms during biooxidation of arsenite and bioleaching of zinc sulfide	I.J.T. Dinkla, P. Gonzalez- Contreras, C.S. Gahan, J. Weijma,	Minerals Engineering, Q1 Elsevier (IF: 5.479) ISSN: 0892-6875	48 & 2013	25-30

		C.J.N. Buisman, M.J.C. Henssen, Å. Sandström			
19	Bench-scale batch bioleaching of spent petroleum catalyst using mesophilic iron and sulphur oxidizing acidophiles	H. Srichandan, D.J. Kim, C.S. Gahan* , S. Singh, S.W. Lee	Korean Journal of Chemical Engineering, Q2 Springer (IF: 3.146) ISSN: 0256-1115	30(5) & 2013	1076-1082
20	Microbial depyritization of three different coals by Acidithiobacillus ferrooxidans in a batch stirred tank reactor.	D. J. Kim, C. S. Gahan* , S.Y. Choi, B. G. Kim	Canadian Metallurgical Quarterly, Q2 Taylor and Francis (IF: 1.037) ISSN: 0008-4433	52 (2) & 2013	146-152
21	Microbial Desulfurization of Three Different Coals from Indonesia, China and Korea in Varying Growth Medium	D. J. Kim, C.S. Gahan* , C. Akilan, S.Y. Choi, B.G. Kim	Korean Journal of Chemical Engineering, Q2 Springer (IF: 3.146) ISSN: 0256-1115	30(3) & 2013	680-687
22	Studies on the effect of coal particle size on biodepyritization of high sulfur coal in batch bioreactor	D.J. Kim, S. Singh, Y.E. Jeong, C.S. Gahan* , B.G. Kim	World Academy of Science, Engineering and Technology ISSN: 2010-376X	77 & 2012	1815-1820
23	Bioleaching of Valuable Metals from Petroleum Spent Catalyst using Acidophilic Chemolithotrophs: A comparative study	H. Srichandan, S. Singh D.J. Kim, C.S. Gahan* , S.W. Lee	World Academy of Science Engineering and Technology ISSN: 2010-376X	77 & 2012	1809-1814
24	Biohydrometallurgy and Biomineral Processing Technology: A Review on Past Present and Future	C. S. Gahan* , D. J. Kim, H. Srichandan, A. Akcil	Research Journal of Recent Sciences ISSN: 2277-2502	1(10) & 2012	85-99
25	Thermophilic bioleaching of spent petroleum refinery catalyst using <i>Sulfolobus metallicus</i>	D.J. Kim, H. Srichandan, C.S. Gahan* , S.W. Lee	Canadian Metallurgical Quarterly, Q2 Taylor and Francis (IF: 1.037) ISSN: 0008-4433	51(4) & 2012	403-412
26	Bioleaching of Spent Catalyst using Moderate Thermophiles with Different Pulp Densities and Varying size Fractions without Fe Supplemented Growth Medium	H. Srichandan, C.S. Gahan* , D.J. Kim, S.W. Lee	International Journal of Chemical and Environmental Engineering ISSN: 2078-0737	6 & 2012	22-28
27	Comparison of Bioleaching Kinetics of Spent Catalyst by Adapted and Unadapted	D. Pradhan, D.J. Kim, J. G. Ahn,	Korean Journal of Metals and Materials Q3	49(12) & 2011	956-966

	Iron Oxidizing Bacteria - Effect of Pulp Density; Particle Size; Temperature	C.S. Gahan, H.S. Chung, S.W. Lee	(IF: 1.324) ISSN: 1738-8228		
28	Utilisation of steel slags as neutralising agents in biooxidation of a refractory gold concentrate and their influence on the subsequent cyanidation	C.S. Gahan, J.E. Sundkvist, F. Engström, Å. Sandström	Resources, Conservation and Recycling, Q1 Elsevier (IF: 13.2) ISSN: 0921-3449	55(5) & 2011	541-547
29	Use of mesalime and electric arc furnace (EAF) dust as neutralising agents in biooxidation and their effects on gold recovery in subsequent cyanidation	C.S. Gahan, J.E. Sundkvist, Å. Sandström	Minerals Engineering, Q1 Elsevier (IF: 5.479) ISSN: 0892-6875	23(9) & 2010	731-738
30	Effect of the chloride ions on ferrous-iron oxidation by Leptospirillum ferriphilum-dominated chemostat culture	C.S. Gahan, J.E. Sundkvist, M. Dopson, Å. Sandström	Biotechnology and Bioengineering, Q1 , Wiley (IF: 3.8) ISSN: 0006-3592	106(3) & 2010	422-431
31	A study on the toxic effects of chloride on the biooxidation efficiency of pyrite	C.S. Gahan, J.E. Sundkvist, Å. Sandström	Journal of Hazardous Materials, Q1 Elsevier (IF: 14.224) ISSN: 0304-3894	172(2-3) & 2009	1273-1281
32	Comparative study on different steel slags as neutralising agent in bioleaching	C.S. Gahan, M.L. Cunha, Å. Sandström	Hydrometallurgy, Q1 Elsevier (IF: 4.7) ISSN: 0304-386X	95(3-4) & 2009	190-197
33	Study on the Possibilities to use Ashes, EAF Dust and Lime Sludge as Neutralising Agent in Bioleaching	C.S. Gahan, M.L. Cunha, Å. Sandström	The Open Mineral Processing Journal, Bentham Science ISSN: 1874-8414	1 (1) & 2008	26-36
34	Leaching behaviour of industrial oxidic by-products: possibilities to use as neutralisation agent in bioleaching	M.L. Cunha, C.S. Gahan, N. Menad Å. Sandström	Materials Science Forum, Q4 Scientific.net (IF: 0.48) ISSN: 0255-5476	587-588 & 2008	748-752
35	Modeling of Ferrous Iron Oxidation by Leptospirillum ferroxidans-Dominated Chemostat Culture	J.E. Sundkvist, C.S. Gahan, Å. Sandström	Biotechnology and Bioengineering, Q1 , Wiley (IF: 3.8) ISSN: 0006-3592	99(2) & 2008	378-389
36	Possibilities to use oxidic by-products for precipitation of Fe/As from leaching solutions for subsequent base metal	M.L. Cunha, C.S. Gahan, N. Menad, Å. Sandström	Minerals Engineering, Q1 Elsevier (IF: 5.479) ISSN: 0892-6875	21(1) & 2008	38-47

	recovery				
37	Beneficiation of iron ore slime using <i>Aspergillus niger</i> and <i>Bacillus circulans</i>	N. Pradhan, B. Das, C.S. Gahan , R.N. Kar, L.B. Sukla	Bioresource Technology, Elsevier Q1 (IF: 11.4) ISSN: 0960-8524	97(15) & 2006	1876-1879
38	Biosorption of copper by <i>Aspergillus flavus</i>	C.S. Gahan , R. Kumari, N. Pradhan, S.K. Samal, R.N. Kar, L.B. Sukla	Transactions of the Indian Institute of Metals, Springer Q2 (IF: 1.391) ISSN: 0972-2815	58(5) & 2005	
39	Bacterial Diversity present in Uranium mines of Jharkhand	S.K. Samal, A. Mishra, C.S. Gahan , N. Pradhan, R.N. Kar, L.B. Sukla, V.M. Pandey	Transactions of the Indian Institute of Metals Springer Q2 (IF: 1.391) ISSN: 0972-2815	58(5) & 2005	

* Corresponding Author

PAPERS PRESENTED/PUBLISHED IN NATIONAL/INTERNATIONAL CONFERENCES

S.No	Title of the Paper	Author(s)	Name of the Conference	Venue & Date
1	Bioleaching of petroleum refinery spent catalyst for base metal recovery: Our Journey from waste to wealth	C. S. Gahan S. Aachhera, S. Tiwari, H. Garg, N. Nagar	3rd International Conference on Bioprocess for Sustainable Environment and Energy (ICBSEE)-2022, 20-24 June, 2022.	Department of Biotechnology and Medical Engineering, National Institute of Technology Rourkela, Odisha, India
2	Comparative assessment of biological desulphurization of Coal by Laboratory culture and native (indigenous) culture of iron and sulphur oxidising microorganisms	S. Tiwari, S. Aachhera, A. Kashyap, C. S. Gahan	3rd International Conference on Bioprocess for Sustainable Environment and Energy (ICBSEE)-2022, 20-24 June, 2022.	Department of Biotechnology and Medical Engineering, National Institute of Technology Rourkela, Odisha, India
3	An Innovative approach for enhancing zinc microbial mediated zinc recovery from zinc sulphide concentrate in a redox controlled fed-batch process	S. Aachhera, S. Tiwari, M. K. Gupta, C. S. Gahan*	3rd International Conference on Bioprocess for Sustainable Environment and Energy (ICBSEE)-2022, 20-24 June, 2022.	Department of Biotechnology and Medical Engineering, National Institute of Technology Rourkela, Odisha, India
4	A study on biosorption kinetics of Cu ²⁺ and Zn ²⁺ in sulphate medium using wooden chips of <i>Acacia</i>	S. Aachhera, H. Garg, S. Singh	2nd International Conference On Bioprocess for	Department of Biotechnology and Medical

	<i>nilotica</i>	N. Nagar, S. Tiwabook ri, C. S. Gahan	Sustainable Environment and Energy ICBSEE-2020	Engineering NIT Rourkela- 769008 March 5-7, 2020
5	Comparative biosorption kinetics study of Nickel and Zinc metal ions from aqueous phase in sulphate medium by the wooden biomass of <i>Dalbergia sissoo</i>	S. Tiwari N. Nagar M. Rojra H. Garg S. Aachhera C. S. Gahan	2nd International Conference On Bioprocess for Sustainable Environment and Energy ICBSEE-2020	Department of Biotechnology and Medical Engineering NIT Rourkela- 769008 March 5-7, 2020
6	A Comparative study on recovery and leaching kinetics of Zn from ZnS concentrate in redox non-controlled and redox controlled bioleaching systems	N. Nagar, H. Garg C.S. Gahan	National conference on Green Technology for Clean Environment (GTCE- 2019)	Shiksha O' Anusandhan University Bhubaneswar, Odisha, India, 20 May 2019.
7	Bioleaching of mobile phone printed circuit boards using pure iron oxidizing and pure sulfur oxidizing microorganisms	H. Garg, N. Nagar, C. S. Gahan	National conference on Green Technology for Clean Environment (GTCE- 2019)	Shiksha O' Anusandhan University Bhubaneswar, Odisha, India, 20 May 2019.
8	Batch bioleaching of base metals from waste mobile phone PCBs with three different pulp densities.	H. Garg C.S. Gahan	International conference on Bioprocess for sustainable Environment and Energy (ICBSEE)- 2018	NIT Rourkela, Odisha, India, 6-7 December, 2018
9	Effect of grinding time on bioleaching of copper from copper slag	N. Nagar, C.S. Gahan	International conference on Bioprocess for sustainable Environment and Energy (ICBSEE) 2018	NIT Rourkela, Odisha, India, 6-7 December, 2018
10	Comparison of batch and fed batch bioleaching of Zn from Sphalerite	C. S. Gahan S. Behera	National conference on Waste to wealth in mineral and metallurgical industries (WMMI) 2018	CSIR-IMMT Bhubaneswar, Odisha, India, 9-10 March, 2018
11	Comparative study of batch and fed-batch processes for bioleaching of base metals from waste mobile phone PCBs.	H. Garg, C.S.Gahan	National conference on Waste to wealth in mineral and metallurgical industries (WMMI) 2018	CSIR-IMMT Bhubaneswar, Odisha, India, 9-10 March, 2018
12	Batch bioleaching of nickel and copper from spent petroleum refinery catalyst using iron and sulphur oxidizing chemolithotrophs	N. Nagar, C.S. Gahan	National conference on Waste to wealth in mineral and metallurgical industries (WMMI) 2018	CSIR-IMMT Bhubaneswar, Odisha, India, 9-10 March, 2018
13	Microbial Hydrometallurgy and Waste Recycling	C. S. Gahan (Plenary Speaker)	National Seminar On "Recent Trends in Microbiology and	MIT School of Biotechnology, 2(P), Infocity,

			Biotechnology (RTMB-2018)" Abstract book Page No 4-5	Patia, Chandaka Industrial Estate, Bhubaneswar-751024 Odisha 16-17 March 2018
14	Managing E-Waste	C. S. Gahan (Invited Lecture)	Workshop on "Managing Waste to Wealth"	J. K. Lakshmi pat University, Jaipur, 15 Feb. 2017
15	Fed-batch vs. batch bioleaching of zinc sulphide ore.	H. Garg, P. Bharti, C.S.Gahan	4 th Rajasthan Science Congress. 2016	J. K. Lakshmi pat University Jaipur, Rajasthan, India, 15-17 October, 2016
16	Biological Desulphurization Of Coal With Varying pH And Pulp Density	C.S. Gahan L. Kumawat R. Kumar	4 th Rajasthan Science Congress. 2016	J. K. Lakshmi pat University Jaipur, Rajasthan, India, 15-17 October, 2016
17	Optimization of growth medium for Bioleaching of Copper from waste mobile phones	P. Gehlot H. Garg C.S. Gahan	4 th Rajasthan Science Congress. 2016	J. K. Lakshmi pat University Jaipur, Rajasthan, India, 15-17 October, 2016
18	Session I: Introduction to Research Methods Session II: Good Practices in Research Session III: Problems Faced in Good research	C.S. Gahan (Resource Person)	7-Day Workshop on "Research Methodology for Faculty of Science"	The IIS University Jaipur, Rajasthan, India , Centre for Research, Innovation and Training (CRIT), 26th March-1st April 2016.
19	Comparative assessment of chloride and flouride ion on the Fe ²⁺ oxidation kinetics in a <i>Leptospirillum ferriphilum</i> dominated chemostat culture	C. S. Gahan (Invited Speaker)	International conference on Biotechnology & Nanotechnology (ICBN-2016)	The IIS University Jaipur, Rajasthan, India, 30 January-1 February, 2016
20	Development of an Integrated Bio and Hydrometallurgical approach for metal recovery from Waste Electric and Electronic Equipment (WEEE).	H. Garg, C.S.Gahan	International conference on Biotechnology & Nanotechnology (ICBN-2016)	The IIS University Jaipur, Rajasthan, India, 30 January-1 February, 2016
21	Effect of chloride with variable cations on the sulphur oxidation by <i>Acidithiobacillus caldus</i> dominated batch culture.	P. Sharma, A. Akcil, C.S.Gahan	3rd Rajasthan Science Congress, Social Concern of Vaigyanik Drishtikon.2015	Manipal University, Jaipur, Rajasthan, India, Feb 28 -Mar 2, 2015
22	Role of elevated concentration of anion and their counter cations during sulphur biooxidation in Biohydrometallurgy: A review	F. K. Bhati, C. S. Gahan	3rd Rajasthan Science Congress, Social Concern of Vaigyanik Drishtikon.	Manipal University, Jaipur, Rajasthan, India, Feb 28 -Mar 2, 2015
23	Biological recovery of Metal	M. Jangir,	3rd Rajasthan	Manipal

	values from petroleum refinery spent catalyst: a review.	C.S.Gahan	Science Congress, Social Concern of Vaigyanik Drishtikon.	University, Jaipur, Rajasthan, India, Feb 28 -Mar 2, 2015
24	Metal recovery from Waste Electrical and Electronic Equipment (WEE) by microbial process: A review.	R. Kumar, C.S.Gahan	3rd Rajasthan Science Congress, Social Concern of Vaigyanik Drishtikon.	Manipal University, Jaipur, Rajasthan, India, Feb 28 -Mar 2, 2015
25	A study on sulphur oxidation by <i>Acidithiobacillus caldus</i> dominated culture in growth medium supplemented with variable cations of SO ₄ ²⁻ ion	S. Zaki, C. S. Gahan, A. Akcil	International Conference Processing of Lean Grade and Urban Ores (IC-LGO 2015)	CSIR-National Metallurgical Laboratory, Jamshedpur, India 20-22 January, 2015
26	Characterization of Pretreated Electric Arc Furnace (EAF) Dust from Scrap based steel production for its use as a neutralising agent in Biohydrometallurgy.	C.S. Gahan, Å. Sandström	National Conference on Hierarchically Structured Materials (NCHSM 2013),	SRM University, Ramapuram Campus, Ramapuram, Chennai-89, India 24-25 January 2013.
27	Microbial population dynamics during biooxidation of pyrite in chloride supplemented system.	C.S. Gahan, J.E.Sundkvist, Å. Sandström	26th National Convention of Metallurgical and Materials engineers, and National Seminar themed on 'Exploitation of lean grade ores, fines and urban ores- Challenges, Problems and Solutions'	CSIR-National Metallurgical Laboratory (NML), Jamshedpur, India 22-23 January 2013
28	Effect of particle size on the thermophilic microbial leaching of petroleum refinery spent catalyst in iron and sulfur free modified kelly medium	H.Srichandan, C.S. Gahan, D.J. Kim, S. Singh, S.W. Lee	XXVI International Mineral Processing Congress IMPC 2012, Indian Institute of Mineral Engineers (IIME) and the Indian Institute of Metals (IIM), with support from Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR), Indian National Academy of Engineering (INAE) and the Ministries of Mines, Steel and Coal, Government of India.2012	Ashok Hotel, New Delhi, India September 24-28, September 2012
29	Microbial depyritization of	C. S. Gahan,	XXVI International	Ashok Hotel,

	Korean, Chinese and Indonesian coal at varying pulp densities in an iron free 9K growth medium.	S.Y. Choi, D. J. Kim, S. Singh, B. G. Kim	Mineral Processing Congress IMPC 2012, Indian Institute of Mineral Engineers (IIME) and the Indian Institute of Metals (IIM), with support from Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR), Indian National Academy of Engineering (INAE) and the Ministries of Mines, Steel and Coal, Government of India.2012	New Delhi, India September 24-28, September 2012
30	Mesophilic microbial desulphurization of three different coals in 9K growth medium supplemented with and without iron source.	C. S. Gahan, S.Y. Choi, C. Akilan, D. J. Kim, B. G. Kim	The Global R D Centres Symposium 2011- Green Science and Engineering for Health and Environment, 2011	Seoul National University, Seoul, South Korea, 15-16 November, 2011
31	Batch mesophilic microbial desulphurisation of three different coals with varying pulp densities in an iron free 9K growth medium.	S.Y. Choi, C. S. Gahan, D. J. Kim, C. Akilan, B. G. Kim	The Global R & D Centres Symposium 2011- Green Science and Engineering for Health and Environment, 2011	Seoul National University, Seoul, South Korea, 15-16 November, 2011
32	Comparative bioleaching of spent catalyst with different size fractions using moderate thermophilic microorganisms.	H. Srichandan C.S. Gahan, D.J. Kim	The Global R & D Centres Symposium 2011- Green Science and Engineering for Health and Environment, 2011	Seoul National University, Seoul, South Korea, 15-16 November, 2011
33	Detecting numbers and activities of microorganisms in bioleaching and bioprecipitation processes.	I.J.T. Dinkla, P. Gonzalez-Contreras, C.S. Gahan, Å.Sandstrom, J. Weijma, C.J.N. Buisman, M.J.C. Hensen	6th International Symposium on Biohydrometallurgy (Biohydromet '12),	Falmouth, UK, June 18-20, 2012.
34	Bioleaching of spent catalyst using moderate thermophiles with different pulp densities and varying size fractions without Fe supplemented growth medium.,	H.Srichandan, C.S. Gahan, D.J. Kim, S.W. Lee	International Conference on Environmental, Biological and Ecological Sciences, and Engineering (ICEBESE-2012	Zurich, Switzerland, January 15-17, 2012
35	Microbial desulfurization of three different coals in 9K growth	S.Y. Choi, D. J. Kim,	Annual Symposium of Korean Society of	Seoul, South Korea

	medium without Fe-source using mixed mesophilic chemolithotrophic acidophiles.	C. S. Gahan	Geosystem Engineering. 2011	21 st September 2011.
36	Investigation of the bioleaching yields Ni, Mo, V and Al from petroleum refinery spent catalyst using moderate thermophiles at three different size fractions.	H.Srichandan, C.S. Gahan, D.J. Kim	Annual Symposium of Korean Society of Geosystem Engineering. 2011	Seoul, South Korea 21 st September 2011.
37	Bio-derived Methods for Demetallization of Ashes and Fuels.	M.Seferinoğlu, M. Paul, C.S. Gahan, Å. Sandström, M.L. Smith, J. Paul	6th International Green Energy Conference (IGEC-06), 5 th -9 th June 2011	Eskisehir, Turkey, 5 th -9 th June 2011
38	Ferrous iron oxidation by a <i>Leptospirillum ferriphilum</i> dominated culture under electrochemically controlled redox potentials	A. Pawlowska, C.S. Gahan, J.E. Sundkvist, Å. Sandström	19th International Biohydrometallurgy Symposium. 2011	Central South University Changsha, China, Sept 18-22, 2011,
39	Assessment of Steel Slag Compared to conventionally used Lime/Limestone as a Neutralizing Agent during Biooxidation of Pyrite	C.S. Gahan, H. Srichandan, D.J. Kim	2011 Spring Meeting and 36th Conference & 5th Australia-Korea Joint symposium: Resource Recycling-Green and clean Environment, Korean Institute Resources Recycling,	Seoul National University of Science & Technology, Seoul, South Korea 12-13 May 2011
40	Comparative assessment of industrial oxidic by-products as neutralising agents in biooxidation and their influence on gold recovery in subsequent cyanidation.	C.S. Gahan, J.E. Sundkvist, F. Engström, Å. Sandström	XI International Seminar on Mineral Processing Technology (MPT-2010)	National metallurgical Laboratory (NML) Jamshedpur, India 25-26 December 2010
41	Possibilities to use industrial oxidic by-products as neutralising agent in bioleaching.	C.S. Gahan, M.L. Cunha, Å. Sandström	18th International Biohydrometallurgy Symposium-2009	Bariloche, Argentina, 13-17 September 2009
42	Biosorption of copper by <i>Aspergillus flavus</i> .	C.S. Gahan, R. Kumari, N. Pradhan, S.K. Samal, R.N. Kar, L.B. Sukla	International Conference of Indian Institute of Metals (IIM) on 43rd National Metallurgist Day and 59th Annual Technical Meeting FDM-NMD-ATM 2005	Indian Institute of Technology (IIT), Madras, Chennai, India, 14-16th November 2005,
43	Bacterial Diversity present in Uranium mines of Jharkhand.	S.K. Samal, A. Mishra, C.S. Gahan, N. Pradhan, R.N. Kar, L.B. Sukla, V.M. Pandey	International Conference of Indian Institute of Metals (IIM) on 43rd National Metallurgist Day and 59th Annual Technical Meeting FDM-NMD-ATM	Indian Institute of Technology (IIT), Madras, Chennai, India, 14-16th November 2005,

			2005	
44	Isolation and Characterization of both Mesophilic and thermophilic microbial strains from different mines and hot springs water.	A. Mishra, C.S. Gahan, M. Mishra, S. Singh, R.N. Kar, L.B. Sukla	National Seminar on Low Grade Minerals – Challenges and Opportunities, 2005	Hindustan Copper Limited, Malanjkhand, Madhya Pradesh, India 26 th November 2005
45	Microbial Recovery of Uranium using Natural Fungal strains.	A. Mishra, C. Acharya, C.S. Gahan, S.K. Samal, R.N. Kar, L.B. Sukla	National Seminar MICRO-BIOTECH-2005	Dept. of Microbiology, Osmania University, Hyderabad, India. 8-10 December 2005
46	Isolation and Characterization of Bacterial Strains Available in Uranium Mine Water from Jaduguda.	C.S. Gahan, S.K. Samal, N. Pradhan, R.N. Kar, L.B. Sukla, V.M. Pandey, V.N. Misra	International Conference on Emerging Trends in Mineral Processing and Extractive Metallurgy, ICME-2005	CSIR- Institute of Minerals and Materials Technology (Formerly Regional Research Laboratory) Council of Scientific & Industrial Research Bhubaneswar - 751 013, Odisha, INDIA 13-14 June 2005
47	Bio-Beneficiation of Iron Ore Slime.	N. Pradhan, C.S. Gahan, R.N. Kar, B. Das, L.B. Sukla	International Seminar on Mineral Processing Technology MPT-2004	CSIR- Institute of Minerals and Materials Technology (Formerly Regional Research Laboratory) Bhubaneswar - 751 013, Odisha, INDIA, February 19-21, 2004
48	Microbial beneficiation of Iron Ore Slime.	C.S. Gahan, N. Pradhan, R.N. Kar, B. Das, L.B. Sukla	National Seminar on Roles of microbes in Agriculture, Industries & Mines, 2004	Utkal University, Bhubaneswar, Odisha, India 21 st March 2004
49	Microbes in Archaeology.	C.S. Gahan, J. Dixit, B. Sarangi	National Seminar on Roles of microbes in Agriculture, Industries & Mines, 2004	Utkal University, Bhubaneswar, Odisha, India 21 st March 2004
50	Bio-beneficiation of Iron Ore Slime	C.S. Gahan, N. Pradhan, R.N. Kar, L.B. Sukla,	Orissa Bigyan Congress National Seminar on “Science for Society”	Indian Science Congress Association (Bhubaneswar

		B. Das		chapter), November 9 th 2003
51	Linghzhi: A Mushroom herb of spiritual potency and medical wonder.	C.S.Gahan	National Seminar on "Perspective in Microbial Application".	Utkal University, Bhubaneswar, Odisha, India 29 th March 2003

Details of Ph.D. Awarded/Ongoing students

S. No.	Name of Student	Date of Joining/Registration	Title of the Thesis	Status (Awarded/Ongoing)	Supervisor
1	Dr. Himanshi Garg	Enrollment No. 2015PHDMB03 Registration No- CURAJ/RES/MB/2015-2016/MB/03 Date of Joining: 25 th August 2015	Bio-catalyzed leaching of waste mobile phone printed circuit board and zinc sulphide concentrate	Awarded on 1 st November 2019	C S Gahan
2	Dr. Neha Nagar	Enrollment No. 2016PHDMB01 Registration No- CURAJ/RES/2016-2017/MB/01 Date of Joining: 22 nd June 2016	Microbial mediated metal leaching from petroleum refinery spent catalyst and copper slag	Awarded on 31 st October 2019	C S Gahan
3	Ms. Shatakshi Tiwari	Enrollment No./ Registration No.. 2019PHDMB12 Date of Joining: 8 th August 2019	Effects of anions with their variable cations on the iron and sulphur oxidation with maintenance co-efficient study in a batch and chemostat cultures	Ongoing since 8 th August 2019	C S Gahan
4	Ms. Sugandha Aachhera	Enrollment No./ Registration No.. 2019PHDMB13 Date of Joining: 8 th August 2019	Integrated approach for bioleaching of metal values from secondary minerals resources	Ongoing since 8 th August 2019	C S Gahan

NUMBER OF UG AND PG PROJECT/THESIS - COMPLETED / ONGOING:

Sl.No.	Name of students	Year	Title of Thesis	Supervisor
1	Jonathan Ledgerwood Mark Gituma (B.Sc Chemical Engineering)	2010	Measurement of Diffusion – Reaction Phenomena in the Chloride Heap Leaching of Chalcopyrite	J. Petersen C. S. Gahan
2	Rajni Kumari (M.Sc Biotechnology)	2005	Biosorption of copper using <i>Aspergillus niger</i> and <i>Aspergillus flavus</i>	L. B. Sukla C. S. Gahan
3	Sadiqa Zaki (M.Sc Microbiology)	2014	A study on sulphur oxidation by <i>Acidithiobacillus caldus</i> dominated culture in growth medium supplemented with variable cations of SO ₄ ²⁻ ion	C. S. Gahan
4	Jyoti Kanwar (M.Sc Microbiology)	2014	Influence of NO ₃ ⁻ ions on the microbial sulphur oxidation with variable cation of Na ⁺ , K ⁺ and Ca ²⁺	C. S. Gahan

5	Prerna Sharma (M.Sc Microbiology)	2014	Role of Chlorides in Biohydrometallurgy: With special reference to sulphur oxidising chemolithotrophic microbes	C. S. Gahan
6	Rakesh Kumar (M.Sc Microbiology)	2015	Microbial depyritization of Coal with varying pulp density	C. S. Gahan
7	Firoz Khan Bhati (M.Sc Microbiology)	2015	Effect of Chloride-sulphate-nitrate ions on the microbial Fe and S oxidation	C. S. Gahan
8	Monika Jangir (M.Sc Microbiology)	2015	Comparative bioleaching of spent catalyst using Fe and S oxidisers	C. S. Gahan
9	Priya Bharti (M.Sc Microbiology)	2016	Fed-Batch vs. Batch Bioleaching of Sphalerite	C. S. Gahan
10	Lakshyata Kumawat (M.Sc Microbiology)	2016	Microbial desulfurization of coal with and without pH control condition	C. S. Gahan
11	Komal Jain (Integrated M.Sc Microbiology)	2016	Effect of elevated ferrous iron concentration on the bio-oxidation mediated by Fe and S oxidizing microorganisms	C. S. Gahan
12	Priyanka Gehlot (Integrated M.Sc Microbiology)	2016	Optimization of Growth Medium for Bioleaching of Copper from Waste Mobile Phones	C. S. Gahan
13	Nafees Ansari (MSc Microbiology)	2017	Comparative assessment of batch and fed-batch bioleaching processes for base metal recovery using waste mobile phones printed circuit board (PCB)	C. S. Gahan
14	Neha Sharma (MSc Microbiology)	2017	Bioleaching of Copper and Nickel from petroleum refinery spent catalyst of Mathura Refinery with varying pulp density	C. S. Gahan
15	Nidhi Kumari (MSc Microbiology)	2017	Comparative Assessment of Fungal Adsorption Kinetics of Copper and Zinc	C. S. Gahan
16	Nisha Kumari (Integrated M.Sc Microbiology)	2017	The comparative study on microbial leaching of copper slag	C. S. Gahan
17	Ankita Solanki (Integrated M.Sc Microbiology)	2017	Bioleaching of coal with varying temperature and pulp density	C. S. Gahan
18	Shivananda Behera (Integrated M.Sc Microbiology)	2017	Fed-Batch vs. Batch bioleaching in shake flask and reactor	C. S. Gahan
19	Himanshi Sharma (MSc Microbiology)	2018	Effect of grinding time on bioleaching of copper slag	C. S. Gahan
20	Meenakshi Dhaka (MSc Microbiology)	2018	Zinc recovery using batch and fed-batch bioleaching from sphalerite concentrate	C. S. Gahan
21	Khusboo Mehta (MSc Microbiology)	2018	Bioleaching vs. Chemical leaching of waste mobile phone Printed circuit board (PCB) for copper recovery	C. S. Gahan
22	Subhangini Singh (Int. M.Sc Microbiology)	2018	Biosorption of Copper and Zinc ions using <i>Acacia nilotica</i> biomass	C. S. Gahan
23	Mohd Ashkeen Shekh (Int. M.Sc Microbiology)	2019	The study of biosorption of Nickel and Zinc using <i>Ficus tsjekela</i> bark powder.	C. S. Gahan
24	Manish Rojra (Int. M.Sc Microbiology)	2019	Biosorption of nickel and zinc using <i>Dalbergia Sissoo</i> biomass	C. S. Gahan
25	Teena Yadav (MSc Microbiology)	2019	Nickel bioleaching from spent petroleum catalyst in 0K and 4.5K medium using Fe and S microorganisms	C. S. Gahan

26	Nisha Kumari (Int. MSc Microbiology)	2019	Comparative Assessment of Zinc Recovery from a Zinc Sulfide Concentrate in Redox Controlled and Non-Controlled Leaching	C. S. Gahan
27	Ashish Dash (Int. MSc Microbiology)	2019	Bioleaching of E-waste using pure Fe oxidizing (with and without Fe supplemented medium) and pure S oxidizing bacteria.	C. S. Gahan
28	Anju Kumari (MSc Microbiology)	2020	Influence of variable concentration of Cl ⁻ anions on the microbial iron oxidation with Na ⁺ as a cation	C. S. Gahan
29	Bhavna Bhardwaj (Int. MSc Microbiology)	2020	Effect of high ferric concentration on iron oxidizing bacteria in sulfate solution	C. S. Gahan
30	Madhu Kumari Gupta (MSc Microbiology)	2022	Enhancement of Zinc recovery with increasing pulp density of Zinc sulphide through fed-batch bioleaching	C. S. Gahan
31	Abhinandan Kashyap (MSc Microbiology)	2022	Comparative Assessment of Desulphurization of Assam Coal using Lab and Native mixed culture	C. S. Gahan
32	Bivhuti Mallick (MSc Microbiology)	2022	Effect of sulphate ions on ferrous iron oxidation by iron oxidizing bacteria	C. S. Gahan
34	Manphool Choudhary (Int. MSc Microbiology)	2022	A study on the effect of Flouride on ferrous iron oxidation by iron oxidizing microorganisms.	C. S. Gahan
35	Mohd. Kaish (Int. MSc Microbiology)	2023	Bioleaching of spent petroleum catalyst with variable iron concentration using iron oxidizing microorganisms	C.S. Gahan

PATENTS

S. No	Title of Patent	Owners/ Inventors	Status	Year
1	South Korean Patent No. 10-1217259, Application Number 2012-0073027, "Method for Desulfurization of Fossil Fuels using Iron and Sulfur Oxidising Microorganism in Iron free 9K Medium" KIPRIS (Korean Intellectual Property Rights Information Service) Gov. Complex Daejeon Bildg.2-1201 KIPI, 139, Cgeibgsa-ro , Seogu, Daejeon, 35208, Republic of Korea (South Korea)	D.J. Kim, C.S. Gahan	Approved	December 24, 2012.

14. Books/Monographs/Book chapters Published: (Attach Photocopies of the Title Page)

Sl. No	Name of Book/Monograph / Book Chapter	Author(s)	Year of publication	Publisher
1	Application of Industrial Waste in Biohydrometallurgy: A Review on Its Use as Neutralising Agent and Potential Source for Metal Recovery, In: Microbiology for Minerals, Metals, Materials and Environment, [Abhilash, B. D. Pandey, K. A. Natarajan (Eds.)], ISBN: 9781138748781, Chapter 9, pp. 186-208	A. Akcil, C.S.Gahan	2014	CRC Press, Taylor and Francis group.

2	Biooxidation of Refractory Gold Concentrate using Oxidic by Products as Neutralizing Agent followed by Cyanidation. In: Industrial and Environmental Biotechnology, K. Pramanik and J.K. Patra (Eds.), ISBN: 1-62699-014-1 Chapter 3, pp. 33-44.	C.S.Gahan, J.E.Sundkvist, F. Engström, Å. Sandström	2014	Studium Press (India) Pvt. Ltd. New Delhi, India,
3	Influence of Chloride on the Chemolithotrophic Acidophiles in Biohydrometallurgy: A Review, In: Industrial and Environmental Biotechnology, K. Pramanik and J.K. Patra (Eds.), ISBN: 1-62699-014-1 Chapter 4, pp. 45-69.	A. Akcil, C.S. Gahan, C. Erust, A. Tuncuk	2014	Studium Press (India) Pvt. Ltd. New Delhi, India,
4	Microbial Extraction Metal Values from Spent Catalyst: Mini Review. In: Advances in Biotechnology, H.N. Thatoi (Eds.) ISBN: 9781626990135 Chapter 11, pp. 225-239.	H.Srichandan, D.J. Kim, C.S. Gahan, A. Akcil	2013	Studium Press (India) Pvt. Ltd, New Delhi, India,
5	Bio-Hydrometallurgy and its Applications: A review. In: Advances in Biotechnology, H.N. Thatoi (Ed.), ISBN-13: 9781626990135 Chapter 4, pp. 71-100.	C.S. Gahan, H.Srichandan, D.J. Kim, A. Akcil	2013	Studium Press (India) Pvt. Ltd, New Delhi, India,
6	Application of Industrial Oxidic By-products as Neutralising Agent in Bioleaching. In: Microbial Biotechnology, 1st Edition, ISBN 10: 8131308499, ISBN 13: 9788131308493, B.B. Mishra and H.N. Thatoi (Eds.), Chapter 11, pp. 254-297.	C.S. Gahan, M.L. Cunha, J.E. Sundkvist, Å. Sandström	2010	APH Publishing Corporation, 4435-36/7, Ansari Road, Darya Ganj, New Delhi. India
7	Possibilities to use industrial oxidic by-products as neutralising agent in bioleaching and the effect of chloride on biooxidation . (Doctoral Thesis)	C. S. Gahan	2009	Luleå University of Technology. ISSN 1402-1544 / ISBN 978-91-7439-049-0.
8	Comparative study on different industrial oxidic by-products as neutralising agent in bioleaching. (Licentiate Thesis).	C. S. Gahan	2008	Luleå University of Technology. ISSN: 1402-1757 / ISRN LTU-LIC--08/19--SE / NR 2008:19.

PROFESSIONAL TRAINING RECEIVED / SUMMER SCHOOLS / WINTER SCHOOLS ATTENDED:

S. No	Year	Nature of Training	Duration	Organization where training was provided
1.	2023	Online Two-week Refresher Course Botany from Feb. 18, 2023 - March 4, 2023.	2 Weeks 18.02.2023 - 04.03.2023	<ul style="list-style-type: none"> TLC Ramanujan College in collaboration with Government Arts College (Autonomous), Karur, Tamil Nadu, India. (Affiliated to Bharathidasan University, Tiruchirappalli-24) under the aegis of Ministry Of Education Pandit Madan Mohan Malaviya National Mission on Teachers And Teaching.
2.	2023	Interdisciplinary Refresher Course on "Advanced Research	2 weeks 23.1.2023 - 6.2.2023.	<ul style="list-style-type: none"> TLC Ramanujan College in collaboration with Girraj Government College, Nizamabad (Affiliated to Telangana

		Methodology"		University) under the Ministry of Education sponsored Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNTT) scheme
3.	2013-14	UGC-Sponsored 86th Orientation Program	4 weeks 16.12.2013 to 11.01.2014	<ul style="list-style-type: none"> UGC Academic Staff College, Jai Narayan Vyas University, Jodhpur, Rajasthan, India & Central University of Rajasthan, Bandar Sindri, Kishangarh, Rajasthan, India
4.	2015	Science Academies Refresher Course on "advances in chemical sciences and sustainable development"	2 weeks 12.01.2015 to 25.01.2015	<ul style="list-style-type: none"> Indian Academy of Science Indian National Science Academy The National Academy of Sciences Central University of Rajasthan, Bandar Sindri, Kishangarh, Rajasthan, India
4.	2003	Training Course on fermentation Technology	1 Week 27.11.2003 to 4.12.2003	<ul style="list-style-type: none"> Regional Centre, Central Tuber Crop Research Institute, (ICAR), Dumduma, Bhubaneswar, Odisha, India

SPONSORED PROJECTS WORKED AS A RESEARCHER

Period	Sponsoring Organization	Title of Project	Co-Investigators (if any)
Feb 2006 – Oct. 2008 (2.5 Yrs)	FP6 European Union	Ores and Concentrates. WP2 PDR, DII1, BioMine ,	C.S. Gahan & Å. Sandström, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-8.
Feb 2006 – Oct. 2008 (2.5 Yrs)	FP6 European Union	Bioleaching and sustainable exploitation of watses WP2 PDR, DII3, BioMine ,	C.S. Gahan & Å. Sandström Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-23

CONSULTANCY PROJECTS

Period	Organization	Nature of Work	Co-Investigators (if any)
21 st October 2021 to 21 st October 2024 (3 Years)	PRESCOUTER http://www.prescouter.com an Inc. 5000 company, Custom Intelligence from a Global Network of Experts, 29 E. Madison Street Suite 500 Chicago, IL 60602	Steel Slag Utilization in allied disciplines of Application	None except C.S. Gahan 2021. Central University of Rajasthan, India
Oct. 2008- Dec 2008 (3 months)	Continental Precious Minerals Inc. , Sweden	Bioleaching of the mineralisation at Myrviken	C.S. Gahan & Å. Sandström (2009).Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-18.

Jan 2009- May 2009 (6 months)	Continental Precious Minerals Inc. , Sweden	Chemical leaching and bioleaching of the mineralisation at Myrviken	C.S. Gahan & Å. Sandström, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-23.
Nov. 2009 -Jan 2010 (3 months)	Mineralbolaget, Sweden	Bioleaching and chemical leaching of the Baita mines copper concentrate	S.A. Awe, C.S. Gahan & Å. Sandström, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-11.
Dec 2009- May 2010 (6 Months)	Continental Precious Minerals Inc. , Sweden	Leaching of Myrviken shale followed by environmental studies	C.S. Gahan & Å. Sandström, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-30.

INDUSTRIAL EXPERIENCE

Period	Organization	Title of Project and Nature of Work	Co-guides (if any)
1 week	BOLIDEN MINERAL AB, Sweden	Cyanide leaching of biooxidised arsenopyrite concentrate for gold recovery	Jan-Eric Sundkvist

MAJOR PROJECTS COMPLETED

1. Name of Project: *Innovative Biohydrometallurgical approach to recover metal values from petroleum refinery spent catalyst*

Funding Agency: SCIENCE & ENGINEERING RESEARCH BOARD (SERB) (Statutory Body Established Through an Act of Parliament: SERB Act 2008), Department of Science and Technology, Government of India, India

Starting Date: 27th November 2015

End date: 26th November 2018

Approved: July 2015

Status: Completed

Total Outlay: 25.6 Lakhs

File No. YSS/2014/000895

2. Name of Project: *Effect of Cl⁻ ion with variable cations (K⁺, Na⁺, Ca²⁺ and NH₄²⁺) on the Fe²⁺ oxidation and the ΔpH dependence on the maintenance co-efficient (m_s) in a Leptospirillum dominated chemostat culture*

Funding Agency: FP7 Marie curie-Co-Funded Brain Circulation Scheme fellowship (TUBITAK) Co-Funded by European Union FP7 and TUBITAK, Turkey

Date of Submission: October 2012

Approved: December 2012

Status: worked for 5 months (April 2013-August 2013)

TECHNICAL REPORTS (CONSULTANCY PROJECTS)

1. C.S. Gahan & Å. Sandström (2007). Ores and Concentrates. WP2 PDR, October 2007, DII1, **European Union "BioMine"**, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-8.

2. C.S. Gahan & Å. Sandström (2008). Bioleaching and sustainable exploitation of wastes. WP2 PDR, September 2008, DII₃, **European Union "BioMine"**, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-23.

3. **C.S. Gahan & Å. Sandström (2009)**. Bioleaching of the mineralisation at Myrviken, January 2009, *Continental Precious Minerals Inc. , Sweden*, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-18.
4. **C.S. Gahan & Å. Sandström (2009)**. Chemical leaching and bioleaching of the mineralisation at Myrviken, May 2009, *Continental Precious Minerals Inc. , Sweden*, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-23.
5. S.A. Awe, **C.S. Gahan & Å. Sandström (2010)**. Bioleaching and chemical leaching of the Baita mines copper concentrate, January 2010, *Mineralbolaget, Sweden*, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-11.
6. **C.S. Gahan & Å. Sandström (2010)**. Leaching of Myrviken shale followed by environmental studies, April 2010, *Continental Precious Minerals Inc. , Sweden*, Luleå University of Technology, Luleå, Sweden (Technical report) pp. 1-30.

NATIONAL AND INTERNATIONAL AWARDS

1. Young Scientist Award, 3rd International Conference on Bioprocess for Sustainable Environment and Energy (ICBSEE)-2022, 20-24 June, 2022 on the paper entitled "*Bioleaching of petroleum refinery spent catalyst for base metal recovery: Our Journey from waste to wealth*" Department of Biotechnology and Medical Engineering, National Institute of Technology Rourkela, Odisha, India
2. FP6 European Union Fellowship from BioMine Project to pursue Lic. Tech., Process metallurgy at Luleå University of Technology, Luleå, Sweden.
3. Kempestiftelsen Scholarship award for One Year for partial fulfilment of Doktorand at Process metallurgy at Luleå University of Technology, Luleå, Sweden.
4. Special Incentive 10,000 SEK from Luleå University of Technology, Luleå, Sweden, for completing Ph.D. Tech within minimum period of 4 years.
5. FP7 Marie curie-Co-Funded Brain Circulation Scheme fellowship (TUBITAK) for 4 months to work in Suleyman Demirel University, Isparta Turkey Project.
6. Best Oral Presentation Award among all the presentation delivered on various technical sessions of 3rd Rajasthan Science Congress held between February 28th –March 2nd, 2015 at Manipal University, Jaipur, Rajasthan, India
7. Best Student Award from Bhubaneswar Chapter of Indian science Congress Association ISCA 2004.

REVIEWER IN SCIENTIFIC INTERNATIONAL PROJECT PROPOSALS FOR FUNDING

1. **Name of the Funding Agency: Chilean Government** National Fund for Scientific and Technological Development (FONDECYT) of the Chilean National Commission for Scientific and Technological Research (CONICYT), **Chile**.
2. **Title of the Proposal:** "DESIGN OF A LABORATORY NON-INVASIVE NON-DESTRUCTIVE PROCEDURE FOR COPPER SULFIDE HEAP LEACHING PROCESS OPTIMIZATION".

MEMBERSHIP OF ACADEMIES AND PROFESSIONAL SCIENTIFIC SOCIETIES

1. Life Member in Orissa Botanical Society (OBS)
2. Annual member of Association of Microbiologists of India (AMI)

3. Ordinary Member of The South African Society of Microbiology

EDITORIAL BOARD MEMBER IN SCIENTIFIC INTERNATIONAL JOURNALS

1. *Frontiers In Sustainable Food Systems*, Frontiers Journal
2. *International Journal of Biometrics and Bioinformatics*, Computer Science Journals (CSC Journals), Kuala Lumpur, Malaysia
3. *International Journal of Petroleum Technology*, Avanti Publishers, USA
4. *Research Journal of Microbiology*, Publisher: Academic Journals Inc., USA, pISSN: 1816-4935
5. *Research Journal of Environmental Sciences*, Publisher: Academic Journals Inc., USA eISSN: 2152-8238, pISSN: 1819-3412,
6. *Asian Journal of Biotechnology*, Publisher: Academic Journals Inc., USA, pISSN: 1996-0700
7. *Singapore Journal of Chemical Biology*, Publisher: Academic Journals Inc., USA, eISSN: 2010-0108, pISSN: 2010-0094
8. *Microbiology Journal*, Publisher: Academic Journals Inc., USA, eISSN: 2153-0718, pISSN: 2153-0696
9. *International Journal of Petroleum Technology*, Avanti Publishers

REVIEWER IN SCIENTIFIC INTERNATIONAL JOURNALS

1. *Minerals Engineering*, Elsevier
2. *Minerals*, MDPI
3. *Environmental Science and Pollution Research*, Springer
4. *Journal of Sustainable Metallurgy (SUME)*, Springer
5. *American Journal of Applied Mathematics and Statistics*
6. *Trends in Clinical Microbiology*
7. *Waste management*, Elsevier
8. *Journal of Material Cycles and Waste Management*, Springer
9. *Scientific Reports*, Nature
10. *Frontiers In Sustainable Food Systems*, Frontiers
11. *Separation & Purification Technology*, Elsevier
12. *Resources Conservation and Recycling*, Elsevier
13. *Industrial and Engineering chemistry Research*, ACS (American Chemical Society) Publications.
14. *Mineral Processing and Extractive Metallurgy Review*, Taylor and Francis Group.
15. *Journal of Chemical Technology & Biotechnology*, John Wiley & Sons, Inc.
16. *Canadian Metallurgical Quarterly*, © W. S. Maney & Son Ltd
17. *Hydrometallurgy*, Elsevier
18. *International Biodeterioration and Biodegradation*, Elsevier
19. *Waste Management & Research*, SAGE Journals.
20. *Journal of Mining World Express*, Science and Engineering Publishing Company
21. *Research Journal of Microbiology*, Publisher: Academic Journals Inc., USA, pISSN: 1816-4935

22. **Research Journal of Environmental Sciences**, Publisher: Academic Journals Inc., USA eISSN: 2152-8238, pISSN: 1819-3412,
23. **Asian Journal of Biotechnology**, Publisher: Academic Journals Inc., USA, pISSN: 1996-0700
24. **Singapore Journal of Chemical Biology**, Publisher: Academic Journals Inc., USA, eISSN: 2010-0108, pISSN: 2010-0094
25. **Microbiology Journal**, Publisher: Academic Journals Inc., USA, eISSN: 2153-0718, pISSN: 2153-0696
26. **Journal of Engineering Research and Reports**, ISSN: 2582-2926

ORGANIZING/TECHNICAL COMMITTEE MEMBERS IN INTERNATIONAL CONFERENCES

1. **2nd ScienceOne International Conference on Environmental Sciences** held in **October 12-14, 2012** Humber College Blvd., Toronto, Ontario, Canada
2. **3rd ScienceOne International Conference on Environmental Sciences** to be organized in **January 21-23, 2014, Dubai.**

NATIONAL AND INTERNATIONAL CONFERENCES/WORKSHOP PARTICIPATED

1. **Invited speaker** in International Conference "**Recent Trends in Biotechnology and Microbiology (RTBM-2018)**" at Department of Biotechnology, MITS School of Biotechnology, Bhubaneswar from 16 - 17 March, 2018 on the topic entitled "**Microbial Hydrometallurgy and Waste Recycling**".
2. **Plenary speaker** in National Conference "**Recent Trends in Biotechnology and Microbiology (RTBM-2018)**" at Department of Biotechnology, MITS School of Biotechnology, Bhubaneswar from 16 - 17 March, 2018 on the topic entitled "**Microbial Hydrometallurgy and Waste Recycling**".
3. Oral Presentation in the International Conference **Waste to Wealth in Mineral and Metallurgical Industries (WWMMI-2018)** organised by Indian Institute of Metals (IIM), Bhubaneswar Chapter and CSIR-IMMT, Bhubaneswar, Odisha on the topic entitled "**Comparison of batch and fed batch bioleaching of Zn from sphalerite**".
4. Delivered Two Sessions of Lecture as a **Resource Person** in a 7-Day Workshop on "**Research Methodology for Faculty of Science**" held on 26 March-1 April 2016 at IIS University Jaipur.
5. Presented as Invited Speaker at International conference on Biotechnology & Nanotechnology held at Department of Biotechnology of The IIS University (IISU) Jaipur from January 28-February 01, 2016.
6. Oral presentation and Poster presentation in **XXVI International Mineral Processing Congress IMPC New Delhi, India** September 24-28, 2012.
7. Participated in The Global R & D Centres Symposium 2011- **Green Science and Engineering for Health and Environment**, Seoul National University, Seoul, South Korea, 15-16 November. <http://ntl.snu.ac.kr/GRDC2011/index.htm>
8. Participated in **2011 Spring Meeting and 36th Conference & 5th Australia-Korea Joint symposium: Resource Recycling-Green and clean Environment**, Korean Institute Resources Recycling, Seoul National University of Science & Technology, Seoul, Korea.
9. Participated in the **Biohydromet 2010** Conference held in Cape Town, South Africa
10. Poster presentation in 18th **International Biohydrometallurgy Symposium (IBS 2009)**, Bariloche, Argentina, IBS-2009
11. Poster presentation in **3rd International Symposium on Bio- & Hydrometallurgy (BioHydromet 2007)**, organised by Minerals Engineering International Falmouth, UK

12. Poster presentation in **2nd & 3rd BERGFORSK 2007 & 2008 Annual meeting**, Luleå University of Technology. Swedish Mining Research Foundation MITU, Luleå, Sweden.
13. Oral and poster presentation in annual conference of the **Indian Institute of Metals (IIM) FDM-NMD-ATM 2005**, held in Indian Institute of Technology (IIT), Madras, Chennai, India
14. Oral presentation in **National Seminar MICRO-BIOTECH-2005** held in Dept. of Microbiology, Osmania University, Hyderabad, India
15. Oral presentation in **National Seminar on Low Grade Minerals – Challenges and Opportunities 2005** organised by Malanjkhand Copper Project (MCP) of Hindustan Copper Limited, Malanjkhand, Madhya Pradesh, India.
16. Oral presentation in **International Conference on Emerging Trends in Mineral Processing and Extractive Metallurgy, ICME-2005** held in Institute of Minerals and Materials Technology, IMMT (Formerly Regional Research Laboratory), Bhubaneswar, India.

FOREIGN COUNTRIES EXPERIENCE/VISITS: (5 COUNTRIES)

1. **SWEDEN**: PhD student and Post doc Research Fellow at Lulea University of Technology for **4 years 3 months (Feb 2006-May 2010)**
2. **SOUTH AFRICA**: Post doc Research Fellow at University of Cape Town for **10 months (May 2010 – Feb 2011)**
3. **ARGENTINA**: Attending Conference IBS 2009 at Bariloche, Argentina for **10 days (10th Sept 2009 - 20th Sept 2009)**
4. **SOUTH KOREA**: Worked as a Regular member in the position of Senior Researcher at Korea Institute of Geoscience and Mineral Resources (KIGAM), **1 year 2 months (March 2011- April 2012)**
5. **TURKEY**: Working as a Experienced Researcher Under FP7 Marie curie-Co-Funded Brain Circulation Scheme fellowship (TUBITAK) at Suleyman Demirel University, Isparta Turkey, **5 months (April 2013 – August 2013)**

ADDITIONAL INFORMATION

PhD work in Brief	<ul style="list-style-type: none"> • Industrial oxidic by-products were tested by bioleaching as neutralisation potential • EAF and Ladle slag were best than other slags • Mesalime was a good neutralising agent • Ashes caused toxic effect on the microorganisms resulting in low bioleaching efficiency. • Sensitivity of <i>L. ferriphilum</i> to change in the bioleaching environment due to fall in redox potential, and <i>Sulphobacillus</i> sp. and <i>At. caldus</i> as robust species and tolerated low redox potential and chloride. • Maintenance activities to ferrous utilization rate for iron conc. and chloride. • Chloride effects μ_{max} and K_s and in the true growth and maintenance.
Research Profile (Short presentation of my research profile after your PhD, maximum 2 pages)	<p><u>Integrated bio-pyro-hydro-metallurgical approach to recover metal values from petroleum refinery spent catalyst</u></p> <p>The present study reports an integrated three-step bio-pyro- hydrometallurgical process to recover nickel (Ni) and molybdenum (Mo) from spent petroleum catalyst. High leaching yields of nickel (94%) and molybdenum (92%) along with other critical metals like rhenium, selenium, niobium, chromium, and zirconium were obtained. A toxic element like Pb was leached entirely from the spent catalyst while precious metal like palladium was concentrated during the treatment. The waste petroleum catalyst and all the residues were characterized to understand the morphology, chemical composition, and mineralogy by Scanning Electron Microscopy-Electron Dispersive X-Ray spectroscopy (SEM-EDAX), X-Ray Fluorescence (XRF) and X-Ray Diffraction (XRD) respectively, while the Ni and Fe</p>

concentration in the bioleach liquor was analyzed by Atomic Absorption Spectroscopy (AAS). In the first stage, bioleaching of spent catalyst leached up to 94% Ni and 71% Mo. The rate-limiting step in Ni bioleaching kinetics was calculated to be both chemically as well as diffusion controlled. The Ni bioleaching followed 1st order reaction kinetics. Integrating roasting (1 h) and alkaline leaching (6 h) with the bioleaching process remarkably increased the recovery of Mo by 21%. Roasting of the spent catalyst after bioleaching lessened not only harmful SO₂ emission by 64.95% but also liberated residual Mo by 23% from the aluminium silicate matrix. Therefore, employing a sequential bio-pyro-hydrometallurgical technique is a more eco-friendly and cost-effective strategy to recover metal values from spent petroleum catalyst.

Assessment of Biological/ Pyro-metallurgical/ Hydro-metallurgical as well as Integrated approach of Bio-pyro-hydro-metallurgical approach to recover Uranium and other metals from alum shale Minrealization from Myrviken, Sweden

Some methods for selective leaching of U, Cu and V from uraniferous shale have been well developed by various researchers in recent years (Abel Moneim, 2005). Selective leaching of uranium and copper was possible in highly acidic medium at high temperatures, while selective leaching of only uranium was possible in highly alkaline medium at high temperature pug leaching is another good method for selectively leaching aluminium, copper and vanadium in acidic medium. In Sweden the black shale deposit at Myrviken area of Storsjön up to 200 m thick layer contains 0.02% uranium, 0.3% of vanadium, and 0.03% of nickel and 0.04% molybdenum. It has been estimated that Storsjön area contains a total of 4.6 million tons of uranium (SGU 1982). As uranium exploration has resumed since 2002 in Sweden, it would be promising to find the alternative methods for extraction of valuable elements like uranium, vanadium, molybdenum, nickel, cadmium, cobalt and few more. The present study aimed to investigate the extraction potential of uranium, molybdenum and vanadium in specific with a two stage alkaline leaching with a roasting step between two alkaline leaching steps followed by environmental tests to ensure the possibilities for landfill of the waste generated from this process under the European standards regulations. A further study is also aimed to separate the heavy. The leaching yields obtained in the first alkaline leaching stage ranged from 78-80% of uranium and 53-59% of molybdenum from both the solid and liquid analysis. Roasting of the leach residue removed 96 % of the total carbon and 71% of the inorganic carbon together with oxidation of sulphides into oxides observed from the loss of sulphur by 35% in the roasted residue. A second alkaline leaching on the roasted residue resulted with a recovery of 60-69% for molybdenum, together with a recovery of 42-51% for uranium based on solid and liquid analysis. Leaching recovery of vanadium was low, while nickel did not leach even after oxidation of the material via roasting. The total leaching recovery of uranium and molybdenum was high with recoveries of 86- 90% for uranium and 81-87% for molybdenum. The environmental studies conducted on the final 16 leach residue passed the standard limit made by the European environmental standards for landfill of inert wastes. However no standard limit is given for either uranium or vanadium. Therefore, the final residue generated from the present investigation needs no treatment prior to landfill as an inert waste. A further study conducted to separate the heavy fraction via gravity separation method to investigate the gold content in the heavy fraction of the shale resulted with 0.05 ppm of gold in the heavy fraction, which was not detected in the feed. However the gold content observed in the heavy fraction was uncertain due to its low content hence, it was difficult to draw certain conclusions from this study.

Bioleaching of Zinc Sulfide Concentrate (Sweden) in Redox-Controlled Fed-Batch Process Compared to Redox Non-controlled Batch Process

The study aims to evaluate bioleaching of zinc sulfide concentrate in controlled

redox potential fed-batch mode to avoid passivation occurring in redox non-controlled bioleaching. The microorganisms used in the bioleaching study were a mixed culture of iron-oxidizing microorganisms dominated with *Leptospirillum ferriphilum*. The motivation for the study was to cut down the cost involved in oxygen consumption due to suppression of sulfur oxidation and activating iron oxidation activity. This innovative approach was possible by carrying out bioleaching on a fed-batch mode with redox potential-controlled bioleaching. The redox-controlled bioleaching was carried out by 100% (v/v) inoculum with high redox potential 650 mV in the reaction vessel with controlled addition of zinc sulfide concentrate maintaining the redox between 550 and 650 mV. The solid percentage of 1% (v/v) of feed material (ZnS concentrate) in the redox-controlled experiment was considered for a batch mode of redox non-controlled experiment for a potential comparative assessment of fed-batch and batch modes. The fed-batch experiment succeeded in restricting the sulfur passivation layer. The time taken by the fed-batch experiment was two times shorter than the batch experiment. The recovery percentage of Zn in redox-controlled batch mode experiment was 51.6%, while in redox-controlled fed-batch mode experiment was 69.4%, which resulted in 34.55% higher recovery in redox-controlled fed-batch bioleaching of ZnS concentrate. The fed-batch bioleaching using iron-oxidizing microorganisms with controlled redox potential restricted sulfur oxidation and was advantageous over the batch process

Post-doc work at UCT CapeTown, South Africa

Chalcopyrite heap leaching is known to be a less capital and operational expensive alternative to the high pressured leaching or pyrometallurgical process. The downside to using heap leaching is the process is slow. The research aimed to investigate the influence of diffusion on this process and its affects the solution potential which is directly responsible for the leaching rate. Investigation on the solution potential as a function of stagnant layer height, effect on various lengths of stagnant layers on dissolution rate was studied. The factors which were not included in the study were effect of pH, chloride ion concentration and Dissolved Oxygen concentration, effect of temperature on dissolution rate. The major hypothesis was to investigate rate of chalcopyrite dissolution if lowered by a diffusion layer due to the mass transfer of Cu^{2+} together with the diffusion length as a function of solution potential. The solution potential might pose a minima where the cupric to cuprous ratio ($\text{Cu}^{2+}/\text{Cu}^+$) were the lowest, which might not be at the surface of chalcopyrite and would indicate a maximum production of Cu^+ ions. The purpose of this investigation was to understand the reason for slow rate of dissolution of chalcopyrite and also to investigate if the mass transfer limitations are responsible for the same. The investigation and study aimed to establish a clear relationship between the diffusion length (the stagnant layer) and the solution potential along with influence of solution potential on dissolution rates at different diffusion lengths. The other aspect was to understand the mechanisms occurring at different diffusion lengths and followed by establishing the phenomenon whether the rate of dissolution is controlled by diffusion limitations. The key questions which were decided to be answered were if the minima potential hypothesis were determinable in the laboratory followed by the factors influencing the formation of minima in the potential. It was also planned to observe if the distance formed of the minima potential a factor of Cu^{2+} diffusion, which forms close to the surface but if it inhibit dissolution process and lastly if it happened how could it be determinable experimentally and incase it's not possible how is it possible to determine indirectly. The results obtained from control experiments showed that initial dissolution rate was not dependent on the presence of copper or oxygen, whereas the rate of dissolution was enhanced once the solution approached potential window. For the solution containing no copper where Fe^{2+} ion was used as an oxidizing agent to oxidize CuS and H_2S to form sulphur and Cu^+ , Fe^{2+} ion worked as an oxidizing agent in the absence of oxygen. In

the experiments carried out on diffusion mechanism it was found that the thicker the bed the slower was the rate of dissolution but once the thickness of diffusion layer was above 10 mm size the rate of dissolution was less dependent on the thickness of the stagnant bed, which reveals the fact that the reaction rate is more limiting than the diffusion layer. The dissolution rate followed two pathways, either the H₂S pathway or the CuS pathway, however the selectivity in the stagnant layer experiment suggested that CuS pathway was more favorable compared to H₂S pathway. The Cupric iron (Cu²⁺) was identified in the mixture solution after 2 hours because of the selectivity of dissolution to CuS as opposed to H₂S pathway. The copper concentration was higher in the well mixed solution than at the surface of the chalcopyrite. Copper ions initially diffused into the silica bed into the chalcopyrite and oxidized CuS to produce Cu²⁺ which ultimately was responsible for building up of Cu²⁺ ion concentration at the surface of chalcopyrite and once this concentration approached the concentration of the copper in the bulk solution this copper led to diffuse out into the well mixed solution (saturation point theory). The redox change was observed to be very rapid initially followed by slowing down of the potential which might have caused due to the saturation point phenomena. Which led to the theory that in the stagnant layer there exists a minima potential which confirmed by the hypothesis. The recommendation was made that an experiment must be conducted to test the effect pH on redox and to better understand the control of redox potential using pH. Experiment's should be carried out for longer periods of time to investigate the quassi-steady state effect on redox, pH and dissolution. Investigate the selectivity of chalcopyrite dissolution via CuS or H₂S pathways. This can be done by conducting mineralogical studies on leach residue after every hour and calculating CuS to total copper ratios under the same conditions as the experiment. If the ratio turns out high it is clear that CuS is in great quantities and thus favored. With regards to the diffusion experiments, in order to test the saturation point hypothesis, the reagents used in the stagnant film experiments should have no initial copper dissolved into it. If this is valid the trend found by having no initial copper will be different from the trend found if initial copper is present. To test the presence of CuS precipitate in either the chalcopyrite and/or silica, a mineralogical data test should be done on both experiments. The redox profile of the entire bed should be checked, by having a more than two electrodes running across the length of the bed, to test if the minima is close to the surface.

Marie Curie Fellowship Research work

The research area I have been working on broadly covers the research area of Biohydrometallurgy and Recycling of Wastes. All these studies utilize chemolithotrophic iron and sulfur oxidizing microorganism's for both fundamental and applied aspects. In fundamental studies I work on the project entitled "*Effect of Cl⁻ ion with variable cations (K⁺, Na⁺, Ca²⁺ and NH₄²⁺) on the Fe²⁺ oxidation and the ΔpH dependence on the maintenance co-efficient (m_s) in a Leptospirillum dominated chemostat culture*". This work was funded by FP7 Marie curie-Co-Funded Brain Circulation Scheme fellowship (TUBITAK) Co-Funded by European Union FP7 and TUBITAK, Turkey (Marie Curie Fellowship) in collaboration with Suleyman Demirel University, Ispart, Turkey.

Research at Central University of Rajasthan

Recycling of several Industrial waste for the recovery of base metals (Mo, V, Co, Ni) from Petroleum refinery spent catalyst collected from Indian Oil Corporation Limited, Mathura Refinery, Uttar Pradesh is one of primary work being carried out. The objective is to recycle the spent catalyst prior to its disposal for landfill by an innovative approach of combining Biohydrometallurgy (Microbial leaching) – Pyrometallurgy (Roasting) – Hydrometallurgy (Alkali Leaching) to ensure a zero waste technology by proper environmental testing. SERB-DST, Govt. of India has provided me 25.6 lakhs to carry out the research on the project entitled "*Innovative Biohydrometallurgical approach to recover metal values from petroleum refinery spent catalyst*".

The study investigates the microbial assisted metal leaching from two different industrial wastes viz. petroleum refinery spent catalyst and copper slag. Prior to bioleaching all the seven unknown spent catalyst samples (SC1- SC7) were characterized and classified. All the samples had a lesser amount of metal values, unlike SC6 which had high molybdenum and nickel content of 32% and 5.2% respectively. Moreover, all the samples were revealed to be a potential source for metal recovery by bioleaching using iron and sulphur oxidizing microorganisms due to the presence of iron and sulphur content in them. Bioleaching successfully leached metal values like Ni, Cu, Cr, Mo, Sr, Zn and Ti in samples SC1, SC2, SC3, SC5 and SC7. On bioleaching SC6, it was found that Ni leaching kinetics is a fast process and maximum Ni dissolution (94%) takes place in initial 4- 5 days of the bioleaching treatment. The Ni dissolution rate of $0.005\text{g}\cdot\text{L}^{-1}\cdot\text{h}^{-1}$ was enhanced by 7 times on increasing the concentration of a biooxidized ferric ion in the bioleaching medium. Bioleaching could leach only 71% Mo from SC6. To liberate residual metal from the carbonaceous matrix roasting of the bioleach residue was done at $700\text{ }^{\circ}\text{C}$ for an hour. Roasting after bioleaching minimized SO_2 emission by 64%. After the burning of coke, the roasted bioleach residue was treated with an alkali solution of carbonate-bicarbonate ion in 2:1 ratio resulting in a 93% Mo recovery. Other metals like Se, Re, Ga were also leached out to a maximum extent. Precious metal Pd was concentrated by 20% and toxic elements like As and Pb was below the toxic limits. Therefore, an integrated approach of Bio-pyro-hydrometallurgy successfully leached out maximum metal values from the spent catalyst.

Another industrial waste was copper slag. Copper slag sample was pre-treated by grinding for different time Summary 99 periods (15 min, 30 min, 60 min and 90 min) to study the effect of grinding time on copper bioleaching. The 60 minute and 90 minutes grounded copper slag resulted in high copper recoveries of 84% and 86%. Copper leaching rate was highest in 90 minutes ground copper slag. The copper leaching kinetics increased with the increased grinding time. Therefore, grinding time of 90 minutes was found to be most suitable for enhanced Cu recovery and leaching rates.

The present study deals with metal recovery from mobile phone printed circuit board (PCB) (Secondary metal resource) and ZnS concentrate (primary metal resource). The waste mobile phones were collected, dismantled and PCB was crushed, ground and sieved to get a fine particle size for the further bioleaching studies. The PCB samples were characterized for their elemental as well as mineralogical composition. The copper was found to be one of the major base metal in PCB. The bioleaching studies on mobile phone PCB focused on the recovery as well as dissolution rate of Cu by the activity of Fe-oxidizing, S-oxidizing, and mixed culture of Fe and S-oxidizing microorganisms. The primary concern in bioleaching of mobile phone PCB was its low Cu dissolution kinetics and toxicity of feed at higher P.D. The bioleaching in fed-batch system was conducted with small feed additions to minimize the toxic effects as well as to maintain a high oxidant concentration, but it was limited to lower P.D. due to jarosite precipitation. The bioleaching at batch mode with a balanced cycle of Fe^{2+} and Fe^{3+} was found to be useful for higher P.D. However, the Cu recovery in all the batch bioleaching experiments with mixed culture of Fe and S oxidizing microorganisms resulted with 90-99% of the Cu recovery, but the Cu dissolution rate was slower in comparison to pure ferric leaching. The bioleaching in pure proton leaching also resulted in 95% of the Cu with a slowest Cu recovery. To enhance the Cu dissolution, rate another bioleaching experiment was conducted with only Fe oxidizing microorganisms in Fe supplemented medium, which resulted with 100% Cu recovery and maximum Cu dissolution rate. The bioleaching with only S oxidizing microorganisms resulted in the minimum Cu recovery and slowest dissolution rate. The less activity of S Summary 122 oxidizing microorganism during bioleaching was marked due to the interaction of various anions with their counter cations. The activity was influenced by the increasing concentration of various anions (Cl^- , SO_4^{2-} and NO_3^{2-}). After bioleaching of Cu the bioleached residue was treated by thiourea leaching for

	<p>precious metal recovery. The thiourea leaching after bioleaching helps to reduce the cost of chemical consumption. The leaching resulted in 100% of Au and Ag recovery.</p> <p>The bioleaching of Zn from ZnS concentrate was limited due to the formation of S₀ passivation layer. The bioleaching was done at fed-batch mode with small feed additions to ensure high Fe³⁺ ion concentration with mixed culture of Fe and S oxidizing microorganisms. The experiment resulted in high Zn recovery (84.34%) in comparisons to batch bioleaching (50.28%). Further the bioleaching experiment was conducted with only Fe oxidizing microorganisms at fed-batch and batch mode. The experiment was ended up with P.D. (1%) with 79% of Zn recovery in fed-batch bioleaching. A further fed-batch experiment was done after several cycles of reactivation of Fe oxidizing microorganisms, which was successfully carried out up to a P.D. of 3.13% with an enhanced Zn recovery of 98.30%. The Zn dissolution rate was increased in fed-batch experiment with a Zn adapted culture of Fe oxidizing microorganisms with an enhanced P.D. 6.68% (w/v) and Zn dissolution rate of 0.034 g/L/h respectively. One of the other area I am working on is Bioleaching of zinc from Zinc sulphide ore or sphalerite from the Kayad mines of Hindustan Zinc Limited located in where we focus zinc recovery enhancement by carrying leaching in a fed batch system in a controlled redox potential important for zinc sulphide leaching. However, it was observed that the diffusion controlled leaching occurring in zinc sulphide bioleaching can be improved to chemical controlled leaching by removing the passivation layer created due to reduced Sulphur species around the shrinking core of the zinc sulphide particles.</p> <p>Sulphur removal from coal is a important part in coal Industry where the coal contains huge Sulfur. Research has been carried out preliminarily on the coal collected from Karo Mines, East Bokaro, Bihar and was found to be effective for removal of inorganic Sulphur. Currently we are also working on the coal mines of Odisha where in the coal samples were provided by Mineral Processing department of CSIR-Institute of Minerals and Materials Technology, Bhubaneswar, Odisha.</p>
<p>Research Projects</p>	<p>RESEARCH INTEREST IN BROAD PERSPECTIVE</p> <ul style="list-style-type: none"> • Gold, Silver and Platinum recovery from Mobile PCBs and other Electronic waste using Hydrometallurgy and Biotechnology approach. • Scaling up of e-waste technology to pilot scale plant • Modelling studies using chemostat for fundamental research in understanding bugs activity in acid mine drainage and biomining • Utilizing steel slags, steel dust and incineration ashes as an alternative base material in all possible industrial application. • Utilization of spent catalyst from Petroleum refineries for metal recovery and scale up. • Biosorption of metal ions from waste effluent streams. <p>All the aforesaid research activities planned is based on my current research briefly stated below.</p> <p>The research area I have been working on broadly covers the research area of Biohydrometallurgy and Recycling of Wastes. All these studies utilize chemolithotrophic iron and sulfur oxidizing microorganism's for both fundamental and applied aspects. In fundamental studies I work on the project entitled "<i>Effect of Cl⁻ ion with variable cations (K⁺, Na⁺, Ca²⁺ and NH₄²⁺) on the Fe²⁺ oxidation and the ΔpH dependence on the maintenance co-efficient (m_s) in a Leptospirillum dominated chemostat culture</i>". This work was funded by FP7 Marie curie-Co-Funded Brain Circulation Scheme fellowship (TUBITAK) Co-Funded by European Union FP7 and TUBITAK, Turkey (Marie Curie Fellowship) in collaboration with Suleyman Demirel University, Ispart, Turkey.</p> <p>Recycling of several Industrial waste for the recovery of base metals (Mo, V, Co, Ni) from Petroleum refinery spent catalyst collected from Indian Oil Corporation Limited, Mathura Refinery, Uttar Pradesh is one of primary work being carried out.</p>

	<p>The objective is to recycle the spent catalyst prior to its disposal for landfill by an innovative approach of combining Biohydrometallurgy (Microbial leaching) – Pyrometallurgy (Roasting) – Hydrometallurgy (Alkali Leaching) to ensure a zero waste technology by proper environmental testing. SERB-DST, Govt. of India has provided me 25.6 lakhs to carry out the research on the project entitled <i>“Innovative Biohydrometallurgical approach to recover metal values from petroleum refinery spent catalyst”</i>.</p> <p>Apart from that I have been also working on copper recovery from copper slag from the smelters which is a waste but can be recycled to enrich copper from it. The sample has been received from a collaborative work from the Mineral Processing department of CSIR-Institute of Minerals and Materials Technology, Bhubaneswar, Odisha. The work is dedicated to grinding time versus copper recovery by both chemical leaching and bioleaching.</p> <p>Waste of Electrical and Electronic Equipment’s (WEEE) is another prime area of research where one of my PhD student has received DST-INSPIRE fellowship on the project entitled <i>“Bioleaching of Waste Electrical and Electronic Equipment WEEE followed by subsequent gold or silver recovery by thiosulphate and thiourea leaching”</i> to carry out research on recovery of base metals (Cu, Ni, Zn etc) from Electronic waste of Mobile phones, PCB’s, TV, Calculator, Computer PC, Laptops etc. followed by Non-cyanide (Thiosulphate, Thiourea and Halide) leaching of precious metals such as Gold and silver.</p> <p>One of the other area I am working on is Bioleaching of zinc from Zinc sulphide ore or sphalerite from the Kayad mines of Hindustan Zinc Limited located in where we focus zinc recovery enhancement by carrying leaching in a fed batch system in a controlled redox potential important for zinc sulphide leaching. However it was observed that the diffusion controlled leaching occurring in zinc sulphide bioleaching can be improved to chemical controlled leaching by removing the passivation layer created due to reduced Sulphur species around the shrinking core of the zinc sulphide particles. Another work on Zinc sulphide concentrate is also carried out on Zinc sulphide concentrate obtained from collaborative work with Lulea University of Technology (Technical University) and Boliden AB (Industry) located in Sweden. The purpose for both ore and concentrate is same for improving zinc recovery in controlled redox potential.</p> <p>Biosorption of copper/nickel/cobalt ions using microbial dead biomass or wood husk or rice husk is another area where I model the experimental data and use freundlich and Langmuir models to predict the sorption rate and determine the best conditions for biosorption and can be used for heavy metal sorption and desorption from waste water effluent ponds or channels.</p> <p>Sulphur removal from coal is a important part in coal Industry where the coal contains huge Sulfur. Research has been carried out preliminarily on the coal collected from Karo Mines, East Bokaro, Bihar and was found to be effective for removal of inorganic Sulphur. Currently we are also working on the coal mines of Odisha where in the coal samples were provided by Mineral Processing department of CSIR-Institute of Minerals and Materials Technology, Bhubaneswar, Odisha.</p>
<p>MANAGEMENT POSITIONS</p>	<ul style="list-style-type: none"> • Coordinator, School of Sports Sciences • Head of the Department, Department of Sports Bioscience • Head of the Department. Department of Sports Biomechanics • Head of the Department (In-charge). Department of Sports Psychology • Academic Council member, Central University of Rajasthan. • Chairman, Board of Studies, Department of Sports Bioscience • Chairman, Board of Studies, Department of Sports Biomechanics. • Chairman, School Board, School of Sports Sciences • Chairman, Scrutiny Committee, Recruitment, School of Sports Sciences • Member (HoD), Selection committee Recruitment of Regular Faculty for Department of Sports Bioscience • Member (HoD), Recruitment of Regular Faculty for Department of Sports Biomechanics

	<ul style="list-style-type: none"> • Chairman, Recruitment Temporary Faculty, School of Sports Sciences • Chairman, Recruitment Temporary Non-Teaching staff, School of Sports Sciences
ADDITIONAL ASSIGNMENTS	<p>Team member for Project proposal development and receiving the grants for the Central University of Rajasthan for the following</p> <ol style="list-style-type: none"> 1. 200 seater Girls Hostel at Central University of Rajasthan, from Ministry of Minority affairs Govt of India worth 3 Crores (Indian Rupees): Sanctioned 2017. 2. Development of Teaching Learning Center from Ministry of Human Resources and Development, Govt of India, worth 5.5 Crores (Indian Rupees): Sanctioned 2018 3. Setting up of New School of Sports Sciences with 5 departments from Ministry of Youth Affairs and Sports, Govt of India worth 250 Million/25 Crores (Indian Rupees): Sanctioned 2018 4. Setting up of food testing laboratory at CURAJ, budget (1.3 crores rupees)
Chair/Board Member during the Last Five Years	<ul style="list-style-type: none"> • Academic council member of CURAJ for 3 years • Examination committee member • Recruitment committee member • Purchase committee both member and chairman of the School

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DECLARATION:

I hereby declare that all the information furnished above is true to the best of my knowledge.

Chandra Sekhar Gahan

Chandra Sekhar Gahan