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COGNITION

DIRECTOR'S MESSAGE



Dear NIT Raipur family and well-wishers,

I would like to extend my warmest wishes for the year 2023. I hope that the New Year will be fulfilling, joyous, and constructive for all of us! I take pride in mentioning that the year 2022 was a very productive for NIT Raipur, and the entire institute fraternity made collective efforts in achieving its goals. The year was filled with many achievements and landmarks. NIT Raipur secured the 65th rank in Engineering Category in the National Institutional Ranking Framework (NIRF) 2022 showing continuous improvement in the NIRF score for the fifth year consecutively in comparison to the score of 37.38 in 2018, 39.09 in 2019, 41.58 in 2020, 44.83 in 2021, and now 45.71 in 2022. The Institute was felicitated with 'Shiksha Samman' by Dainik Bhaskar newspaper for its contribution during the COVID-19 pandemic.

Under the Institute Lecture Series initiative, monthly online lectures were organized by various departments on current technical topics by National and International Eminent Personalities for students and faculty of the Institute. After the initiative of organizing brainstorming sessions on different chapters of National Education Policy 2020 (NEP 2020), a one-day workshop was organized to conclude the modalities and finalize the Strategic Implementation Plan document for NEP 2020. In this Strategic Implementation Plan, various actionable points have been identified and documented as short term, medium term and long-term actions. A Taskforce has also been constituted for speedy and smooth implementation of NEP 2020 in the Institute. Most importantly, in order to meet the various requirements of all the stakeholders, the Institute has framed the Vision-2030 document. Considering the classical past, the glorious track record of the current progress, and Vision-2030 to guide us, we are confident that NIT Raipur will emerge as a leading technical Institute in the country. We surely will establish global recognition in the area of high-quality human and knowledge resources. Like previous years, several national and international conferences were organized and several MoUs were also executed in 2022 with Institutions and Industries to further enrich our ties and research collaborations. I must point out here that the Institute has shown remarkable growth in 2022, in terms of student placement, sponsored research projects awarded, the number of research papers published in high-impact factor journals, PhDs awarded, innovation, and Research and Development. Our students, alumni, faculty, and staff continued to bring many laurels to the Institute. I take this opportunity to congratulate them for bringing laurels to the Institute and hope that this trend improves further in the years to come.

To achieve this dream, in 2023 we should focus on innovation, research, teamwork, discipline, integrity, equity, and excellence. I believe that the entire Institute fraternity has a great role to play in it. So, with great optimism, I expect that the faculty, staff, students, and stakeholders will continue to strive hard for achieving our common vision. Your support and cooperation matter a lot.

Once again, I would like to wish all of you a very happy new year! Thank you very much.

Editorial Note : COGNITION

Volume 2, Issue 4



Dear Reader,

We wish you a very Happy New Year! May the year 2023 brings you warmth, success, and good health!

We must mention that the year 2022 was extraordinary for NIT Raipur. Our stakeholders and well-wishers were well-informed about these achievements through Cognition's three earlier quarterly Issues of Volume 2. We now present to you Issue 4 of Volume 2, of Cognition!

Keeping up with the mission and vision of the Institute, the NIT Raipur fraternity strived hard to make remarkable contributions to academics, research, and innovation during the fourth (last) quarter of the year i.e., October 2022 – December 2022. This Issue highlights these, and portrays the strong research culture that is followed by the Institute under the able guidance of Dr. A.B. Soni, Director of NIT Raipur.

This Issue brings you important insight into the various research areas that the Institute is dedicatedly working in. It also shares details of the research articles and chapters written by the faculty and students of the Institute and published by various reputed journals and publishers. The Issue also specifies various research projects

that have been approved or sanctioned in this quarter. It also shares other research-oriented activities such as awarding of patents; signing of MoUs; organizing conferences, seminars, STTPs, etc., initiating start-ups, promoting innovation, etc.

We are certain that this issue will provide you with ample information on academics and research at NIT Raipur. Through this issue, you will be able to draw relevant information.

We must thank Dr. A.B. Soni, Director of NIT Raipur, for her perseverance and consistent efforts in guiding and inspiring us toward achieving the Institute's vision!

We are also grateful to our respected Deans, Heads of all the departments, faculty, researchers, scholars, administrative, and non-teaching staff for all their support.

We would appreciate it if you let us know your queries, inputs, or concerns. We can be contacted at : cognition@nitrr.ac.in.

Once again, we wish you a Happy 2023, and cheers to more shared successes in the new year!

Warm regards!

Editorial Team

Cognition

HEAD



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BEST RESEARCHER AWARD 2021-22

NIT Raipur felicitates the Best Researcher of the Institute with an aim to recognize and motivate faculty members among their peer groups. This award is given to an individual for his/her contributions to research and development in the institution. **Dr. Govind P. Gupta, Assistant Professor in Department of Information Technology** was conferred with the Best Researcher award for the year 2021-2022 for his outstanding contributions to the ongoing research in the field of Artificial Intelligence, Cyber security, and Information & Communication Technologies. The award comprised of citation and a memento.



In past 7.5 years, Dr. Gupta has brought laurels to the institute at many platforms. Recently, he has been included in the list of **top 2% scientists in the world** according to a report (prepared by **Stanford University USA** for year 2022) published by ELSEVIER, USA, on October 11, 2022. He has also been included in the 2021's list of the top 2% scientists in the world (prepared by Stanford University USA) published on Oct 19, 2021. He has published more than 42 research articles in SCI/Scopus journals, 02 edited books, 15 book chapters, and 26 articles in the proceedings of national and international conferences. NIT Raipur family congrats Dr. Gupta on his achievement and wishes him the best for all his future endeavours.

PUBLISHED BOOKS & BOOK CHAPTERS

Title of book: Phytoconstituents and Antifungals

Publisher: Elsevier

ISBN: 978-0-323-91792-6

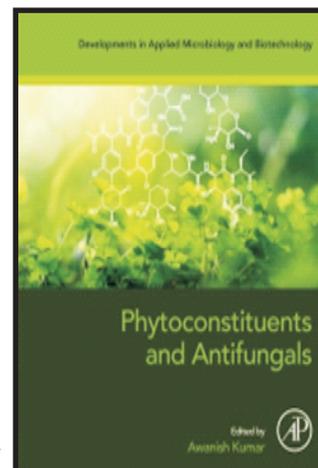
Month and year of publication: October 2022

Authors : Awanish Kumar, Jyoti Sankar, Prusty, Anubhuti Jha

About the book:

Phytoconstituents and Antifungals cover a wide range of specific information on various phytoconstituents, their antifungal mode and the diagnosis and management of fungal infections. The book offers encouragement, and empowers readers to re-embrace their knowledge of phytoconstituents and their various antifungal activities against most opportunistic pathogenic fungi as fungal diseases cause an estimated 1.5+ million deaths annually and over one billion people suffer from severe fungal disease.

Purchase link : <https://www.elsevier.com/books/phytoconstituents-and-antifungals/kumar/978-0-323-91792-6>



Title of book chapter: Towards Design of a Novel Android Malware Detection Framework Using Hybrid Deep Learning Techniques

Publisher: Springer, Singapore

ISBN of book: 978-981-19-3590-9

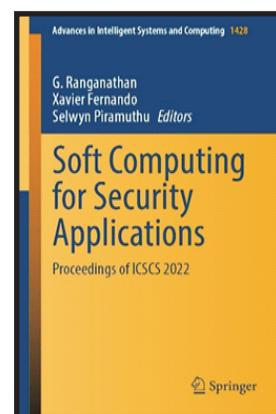
Month and year of publication: October 2022

Authors : Gourab Dhabal, Govind P. Gupta

About the book

Malware designers have switched their focus to the android platform as a result of the widespread use of android smartphones in our daily lives. There is some exiting state-of-the-art techniques whose performance needs to be improved in malware detection for android based system. In this chapter, we have proposed a novel android malware detection framework using hybrid deep learning techniques. In the proposed framework, at first pre-processing steps are employed to get optimized feature set. For the feature selection, this chapter has used gain information and Pearson correlation coefficient techniques in which k-best features are selected using the gain information technique. Furthermore, the Pearson correlation technique is applied to remove the features, which have similar coefficients and do not contribute much to overall results. For the detection of malware, optimized feature-based dataset is used for training of the proposed hybrid of bidirectional long short-term memory (BiLSTM) and merged sparse auto-encoder (MSAE) with softmax deep learning model. Performance analysis of the proposed malware detection framework is compared with three state-of-the-art techniques, such as CNN-BiLSTM, CNN-LSTM and CNN-GRU in terms of accuracy, f1-score, precision and recall. It is observed that the proposed framework performs better than the existing models.

Purchase link: https://link.springer.com/chapter/10.1007/978-981-19-3590-9_15



SPONSORED RESEARCH PROJECTS

Title of the project : Geological Mapping for Manganese Ore in Reserve Area of MOIL in Balaghat district and Reconnaissance Survey in various parts of India

Sponsoring agency : Manganese Ore India Limited (MOIL) Nagpur

Duration : October 2022-September 2023

Amount Sanctioned : Rs. 20.7 Lakhs

Principal Investigator (PI) : Dr. Neeraj Vishwakarma, Department of Applied Geology

Co-PI: Dr. Prabhat Diwan, Department of Applied Geology

Project Summary

The main objectives of this project are to carry out detailed geological field works including geological mapping and preparation of geological cross sections, to carry out petrography of the rock samples and ores, characterization of minerals and ores through EPMA and geochemical analysis of the rocks, minerals and ores. The final outputs of this project will bring great scientific results with high accuracy, which is certainly beneficial to the scientific community, environmentalists, industrial individuals, policy and decision-makers, stakeholders, inhabitants, workers, farmers, and livestock professionals of this region. The project will strengthen the Industry – Academia relationship, which is the prime objective of NEP-2020.

Title of the project : Photoluminescent Lanthanide Metal-ligand Polymer Composite for Sensing and Opto-electronic Studies

Sponsoring agency : SERB-DST, New Delhi

Duration : September 2022-August 2024

Amount Sanctioned : 32.52 Lakhs

Principal Investigator (PI) : Dr. Sagarika Bhattacharya, Department of Chemistry

Co-PI : NA

Project Summary

Recently, photoluminescent sensing techniques have intrigued the attention of the scientists because of its simplicity, authenticity, and sensitivity. A widespread materials like organic dyes, fluorescent lanthanide organic framework (Ln-MOF), quantum dots, carbon quantum dots, organic polymers, lanthanide coordination polymers, and lanthanide metal nano- particles have been employed for selective detection of toxic/heavy metal ions, water soluble anions, explosives, nucleotides, enzymes, and proteins. However, photoluminescent lanthanide-metal complexes or composites have emerged as a protean sensing vehicle for large scale of target analytes over other materials due to their sharp emission band with pure color. The project aims to synthesize palindromic-lanthanide metal complexes embedded in a thin polymer film, as a portable sensing kit. It is proposed to carry off two directional motifs in this project: first, the metal/polymer composite will trap heavy metal ions and toxic anions by immersing the film into contaminated water and second, the metal/polymer composite film would conduit the possibility of construction of light emitting device, particularly a possible way for fabrication of white light emitter.

PUBLISHED RESEARCH PAPERS (October-December 2022)

Title of paper: Synthesis of Mixed Ligand 3D Cobalt MOF: Smar Responsiveness towards Photocatalytic Dye Degradation in Environmental Contaminants.

Authors: Somnath, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal name: Journal of Molecular Structure

Volume/Issue/year: 1265/2022

Web link: <https://doi.org/10.1016/j.molstruc.2022.133399>

SCI/ Scopus Indexed: SCI

Title of paper: Synthesis of a Mixed-Ligand H-Bonded Cu Coordination Polymer: Exploring the pH-Dependent High Photocatalytic Degradation of Rhodamine 6G, Methyl Violet, Crystal Violet, and Rose Bengal Dyes under Room Illumination.

Authors: Somnath, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal name: ACS omega

Volume/Issue/year: 7/45/2022

Web link: <https://pubs.acs.org/doi/10.1021/acsomega.2c04669>

SCI/ Scopus Indexed: SCI

Title of paper: Bifunctional Self-Penetrating Co (II)-Based 3D MOF for High- Performance Environmental and Energy Storage Applications.

Authors: Somnath, Waris, Arif Ali, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal name: Crystal Growth & Design

Volume/Issue/year: 12/22/2022

Web link: <https://pubs.acs.org/doi/10.1021/acs.cgd.2c00978>

SCI/ Scopus Indexed: SCI

Title of paper: Ni-Coordination Polymer as Potential Remedial Compound for Efficient Detection and Seclusion of Toxic Aromatic Dyes from Contaminated Water.

Authors: Priyanka Singh, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal name: Journal of Molecular Structure

Volume/Issue/year: 1274/2023

Web link: <https://doi.org/10.1016/j.molstruc.2022.134422>

SCI/ Scopus Indexed: SCI

Title of paper: Bifunctional bis (2-carboxyethyl) isocyanurate crystal for high-performance photocatalytic degradation of rose Bengal dye and luminescence sensing of PO₄³⁻, NO₃⁻, Cl⁻, Cr²⁺, O₇²⁻ and F⁻ ions.

Authors: Priyanka Singh, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal name: Cryst. Engg. Comm.

Volume/Issue/year: 2023

Web link: <https://doi.org/10.1039/D2CE01387H>

SCI/ Scopus Indexed: SCI

Title of paper: Multifunctional [CdI₄]²⁻·[H₂Bimb]²⁺Complex to Probe High Performance Photocatalytic Degradation of Methyl Violet and Fluorescent Detection of Cr₂O₇²⁻ and Hg²⁺ ions.

Authors: Somnath, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal name: New Journal of Chemistry

Volume/Issue/year: 47/2023

Web link: <https://doi.org/10.1039/D2NJ04957K>

SCI/ Scopus Indexed: SCI

Title of paper: Exploring the pH Reliant High Photocatalytic Degradation of Organic Dyes using H-Bonded Ni (II) Coordination Network.

Authors: Priyanka Singh, Avantika Hasija, Chandrakant Thakur, Deepak Chopra, Kafeel Ahmad Siddiqui

Journal name: Journal of Molecular Structure

Volume/Issue/year: 1276/2023

Web link: <https://doi.org/10.1016/j.molstruc.2022.134784>

SCI/ Scopus Indexed: SCI

Title of paper: Optimization of Wire-EDM Process Parameters for Ti6Al4V Alloy Cutting Using Mayfly Algorithm

Authors: Anitesh Kumar Singh, Kalinga Simant Bal, Dipanjan Dey, Abhishek Rudra Pal, Dilip Kumar Pratihar, Asimava Roy Choudhury

Journal name: Advances in Modern Machining Processes. Lecture Notes in Mechanical Engineering. Springer, Singapore

Volume/Issue/year: 2022

Web link: https://doi.org/10.1007/978-981-19-7150-1_20

SCI/ Scopus Indexed: Conference publication

Title of paper: Resistance-proof antimicrobial drug discovery to combat global antimicrobial resistance threat

Authors: Aditya Upadhayay, Jingjing Ling, Dharm Pal, YuhaoXie, Feng-Feng Ping, Awanish Kumar

Journal name: Drug Resistance Updates

Volume/Issue/year: November 2022

Web link: <https://pubmed.ncbi.nlm.nih.gov/36455341/>

SCI/ Scopus Indexed: SCI

Title of paper: An optimized and efficient android malware detection framework for future sustainable computing

Authors: Santosh K Smmarwar, Govind P Gupta, Sanjay Kumar, Prabhat Kumar

Journal name: Elsevier Sustainable Energy Technologies and Assessments

Volume/Issue/year: Vol. 54, Dec 2022

Web link: <https://www.sciencedirect.com/science/article/pii/S2213138822009006>

SCI/ Scopus Indexed: SCI

Title of paper: Deep malware detection framework for IoT-based smart agriculture

Authors: Santosh K Smmarwar, Govind P Gupta, Sanjay Kumar

Journal name: Elsevier Computers and Electrical Engineering

Volume/Issue/year: Vol. 104, Nov,2022

Web link: <https://www.sciencedirect.com/science/article/abs/pii/S0045790622006279>

SCI/ Scopus Indexed: SCI

Title of paper: A blockchain-orchestrated deep learning approach for secure data transmission in IoT-enabled healthcare system

Authors: Prabhat Kumar, Randhir Kumar, Govind P Gupta, Rakesh Tripathi, Alireza Jolfaei

Journal name: Journal of Parallel and Distributed Computing

Volume/Issue/year: Vol. 172

Web link: <https://www.sciencedirect.com/science/article/pii/S0743731522002106>

SCI/ Scopus Indexed: SCI

Title of paper: Effect of GNPs and Resin Blend on Tear Resistance of 4D Printed Shape Memory Photopolymer Composite

Authors: N Dhanunjayarao Borra, Venkata Swamy Naidu Neigapula

Journal name: Rapid Prototyping Journal

Volume/Issue/year: RPJ/Dec 2022

Web link: [10.1108/RPJ-10-2022-0352](https://doi.org/10.1108/RPJ-10-2022-0352)

SCI/ Scopus Indexed: SCIE

Title of paper: Early prediction of pathological complete response to neoadjuvant chemotherapy in breast cancer MRI images using combined pre-trained convolutional

Authors: Priyanka Khanna, Mridu Sahu, Bikesh Kumar Singh, Vikrant Bhateja

Journal name: Measurement

Volume/Issue/year: 2022

Web link: <https://doi.org/10.1016/j.measurement.2022.112269>

SCI/ Scopus Indexed: SCI

Title of paper: Combining modified hyper learning binary dragonfly algorithm and deep learning for BI-RADS classification of breast masses in mammograms.

Authors: Priyanka Khanna, Mridu Sahu, Bikesh Kumar Singh, Vikrant Bhateja

Journal name: Expert systems

Volume/Issue/year: 2022

Web link: <https://doi.org/10.1111/exsy.13200>

SCI/ Scopus Indexed: SCI

DOI: 10.1007/s11082-022-04097-6

Title of paper: Optimal Threshold Based-High Impedance Arc Fault Detection Approach for Renewable Penetrated Distribution System

Authors: Ch D Prasad, M Biswal, M Mishra, J M Guerrero, O P Malik,

Journal: IEEE Systems Journal

Volume/Issue/year: December 2022

Web: DOI:10.1109/JSYST.2022.3202809

Title of paper: Real-Time Implementation of Fractional-Order PID Controller for Magnetic Levitation Plant With Time Delay

Authors: D S Acharya, S K Mishra, S K Swain, S Ghosh

Journal: IEEE Transactions on Instrumentation and Measurement

Volume/Issue/year: Vol. 71, 2022

Web: doi: 10.1109/TIM.2022.3218566

Title of paper: End to end deep learning system for measurement of area score of psoriasis regions in color images.

Authors: R Raj, ND Londhe, R Sonawane

Journal: Biomedical Signal Processing and Control, 79, 104138.

Volume/Issue/year: Vol.79, December 2022

Web: <https://www.sciencedirect.com/science/article/pii/S1746809422005924>

Title of paper: Synthesis of Mixed Ligand 3D Cobalt MOF: Smart Responsiveness towards Photocatalytic Dye Degradation in Environmental Contaminants.

Authors: Somnath, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal: Journal of Molecular Structure

Volume/Issue/year: Vol. 1265, October 2022

Web: <https://doi.org/10.1016/j.molstruc.2022.133399>

Title of paper: Synthesis of a Mixed-Ligand H-Bonded Cu Coordination Polymer: Exploring the pH-Dependent High Photocatalytic Degradation of Rhodamine 6G, Methyl Violet, Crystal Violet, and Rose Bengal Dyes under Room Illumination.

Authors: Somnath, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal: ACS Omega

Volume/Issue/year: Vol. 7(45), October 2022

Web: <https://pubs.acs.org/doi/10.1021/acsomega.2c04669>

Title of paper: Bifunctional Self-Penetrating Co (II)-Based 3D MOF for High-Performance Environmental and Energy Storage Applications.

Authors: Somnath, Waris, Arif Ali, Musheer Ahmad, Kafeel Ahmad Siddiqui

Journal: Crystal Growth & Design

Volume/Issue/year: Vol. 22(12), October 2022

Web: <https://pubs.acs.org/doi/10.1021/acs.cgd.2c00978>

Title of paper: Early prediction of pathological complete response to neoadjuvant chemotherapy in breast cancer MRI images using combined pre-trained convolutional

Authors: Priyanka Khanna, Mridu Sahu, Bikesh Kumar Singh, Vikrant Bhateja

Journal: Measurement

Web: <https://doi.org/10.1016/j.measurement.2022.112269>

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Authors: Priyanka Khanna, Dr. Mridu Sahu, Dr. Bikesh Kumar Singh, Dr. Vikrant Bhateja

Journal: Expert systems

Web: <https://doi.org/10.1111/exsy.13200>

Title of paper: Effect of GNPs and Resin Blend on Tear Resistance of 4D Printed Shape Memory Photopolymer Composite

Authors: N Dhanunjayarao Borra, VenkataSwamy Naidu Neigapula

Journal: Rapid Prototyping Journal

Web: 10.1108/RPJ-10-2022-0352

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Authors: Santosh K Smmarwar, Govind P Gupta, Sanjay Kumar, PrabhatKumar

Journal: Elsevier Sustainable Energy Technologies and Assessments

Web: <https://www.sciencedirect.com/science/article/pii/S2213138822009006>

Title of paper: Deep malware detection framework for IoT-based smart agriculture

Authors: Santosh K Smmarwar, Govind P Gupta, Sanjay Kumar

Journal: Elsevier Computers and Electrical Engineering

Web: <https://www.sciencedirect.com/science/article/abs/pii/S0045790622006279>

Title of paper: A blockchain-orchestrated deep learning approach for secure data transmission in IoT-enabled healthcare system

Authors: Prabhat Kumar, Randhir Kumar, Govind P Gupta, RakeshTripathi, AlirezaJolfaei

Journal: Journal of Parallel and Distributed Computing

Web: <https://www.sciencedirect.com/science/article/pii/S0743731522002106>

Title of paper: Numerical and Experimental Analysis of Shear Stress Influence on Cellular Viability in Serpentine Vascular Channels

Authors: K. Deshmukh, S.Gupta, K.Mitra, ABit

Journal: Micromachines

Volume/Issue/year: Vol. 13(10), October 2022

Web: <https://www.mdpi.com/2072-666X/13/10/1766>

SCI/ Scopus Indexed: SCIE

Title of paper: Measurement of PM10, PM2.5, NO2, and SO2 Using Sensors

Authors: Vinit Lambey, A. D. Prasad

Journal: Springer Geography book series (SPRINGERGEOGR)

Volume/Issue/year: December 2022

Web: https://link.springer.com/chapter/10.1007/978-3-031-16217-6_6

SCI/ Scopus Indexed: Scopus

Title of paper: A Resilient Protection Scheme for Common Shunt Fault and High Impedance Fault in Distribution Lines Using Wavelet Transform

Authors: B. Maanvi, A. Yadav, A. Swetapadma

Journal: IEEE System Journal

Volume/Issue/year: Vol. 16, December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85130460042&origin=resultslist&sort=plf-f>

SCI/Scopus Indexed: SCI

Title of paper: An Optimally Tuned Rotation Forest-Based Local Protection Scheme for Detecting High-Impedance Faults in Six-Phase Transmission Line During Nonlinear Loading

Authors: T R Althi, E Koley, S. Ghosh

Journal: Iranian Journal of Science and Technology - Transactions of Electrical Engineering

Volume/Issue/year: Vol. 46, December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85134502674&origin=resultslist&sort=plf-f>

SCI/Scopus Indexed: Scopus

Title of paper: DS-P3SNet: An Efficient Classification Approach for Devanagari Script-Based P300 Speller Using Compact Channelwise Convolution and Knowledge Distillation

Authors: G B Kshirsagar, N D Londhe

Journal: IEEE Transactions on Systems, Man, and Cybernetics: Systems

Volume/Issue/year: Vol. December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85127078520&origin=resultslist&sort=plf-f>

SCI/Scopus Indexed: SCI

Title of paper: Preparation and characterization of glass/FTO/CdS/ED-CdTe/Ag thin film for photovoltaic applications

Authors: L. Verma, A Khare

Journal: Journal of Materials Science: Materials in Electronics

Volume/Issue/year: Vol. 33, November 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85139135918&origin=resultslist&sort=plf-f>

SCI/Scopus Indexed: SCI

Title of paper: Theoretical and experimental investigation of Gd³⁺-doped white light-emitting chlorapatite Ca₆Na₂Y₂(SiO₄)₆Cl₂ synthesized by hydrothermal route

Authors: A Rout, S Agrawal

Journal: Indian Journal of Physics

Volume/Issue/year: Vol. 96, December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85127963945&origin=resultslist&sort=plf-f>

SCI/Scopus Indexed: SCIE

Title of paper: Utility optimization-based multi-stakeholder personalized recommendation system

Authors: R Shrivastava, D S Sisodia, N K Nagwani

Journal: Data Technologies and Applications

Volume/Issue/year: Vol. 56, December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85128177925&origin=resultslist&sort=plf-f>

Title of paper: Item feature refinement using matrix factorization and boosted learning based user profile generation for content-based recommender systems

Authors: A Pujahari, D S Sisodia

Journal: Expert Systems with Applications

Volume/Issue/year: Vol. 20615 November 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85132743198&origin=resultslist&sort=plf-f>

Title of paper: Functional characterization of unknown protein sequences using Neuro-Fuzzy based machine learning approach and sequence augmented feature

Authors: S Agrawal, D S Sisodia, N K Nagwani

Journal: Expert Systems with Applications

Volume/Issue/year: Vol. 2051 November 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85131959713&origin=resultslist&sort=plf-f>

Title of paper: Improved Switching Current Ratio with Workfunction Modulated Junctionless FinFET

Authors: M Rathi, G P Mishra

Journal: Silicon

Volume/Issue/year: Vol.14December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85132411828&origin=resultslist&sort=plf-f>

Title of paper: Design of Sub-40nm FinFET Based Label Free Biosensor

Authors: S Kesharwani, M Daga, G P Mishra

Journal: Silicon

Volume/Issue/year: Vol. 14,December 2022

Web: <https://www.scopus.com/record/display.uri?eid=2-s2.0-85130564878&origin=resultslist&sort=plf-f>

CONFERENCES / STTPs Organized (Oct 2022-December 2022)

Title of event: Two Days International Conference On HOUSING: CHALLENGES, POLICIES AND STRATEGIES OF 21ST CENTURY

Duration: October 29-30, 2022

Organizing department: Department of Architecture

Organizing Secretaries: Dr. Vandana Agrawal, Mr. Sayon Pramanik and Ms. Shruti S. Nagdeve

Chairman: Dr. Debashis Sanyal

Course Fee: U.G. / P.G. students: Rs. 1000, Faculty/Researchers/Industry persons, Ph.D. Scholars: Rs. 2000

Brief information about the event:

Housing is a domain, which is ever growing and a constant need. The growth of population both in urban and rural areas demands advancement in strategies, framework and policies that cater to the housing needs of the 21st Century. A vast research is needed for the development with a holistic approach towards the required change. The diverse nature of the research and development that goes into this sector has a multidisciplinary scope. This conference has given a platform for researchers to put forth their ideas in the fields of incremental housing, transformable housing, transitional housing, short & long impact on housing, the planning economies, climate resilience, modular housing, contemporary housing, challenges due to climate change, sustainable housing, green rating systems in housing, alternative material & construction techniques, low cost & vernacular housing and so on. PhD scholars from the department of architecture has been researching on the above-mentioned subheads and indeed contributed vastly to the conference.



Title of event: ATAL FDP on AI and Data Science Based Emerging Trends in Earth Science

Duration: November 07-18, 2022

Organizing department: Department of Information Technology and Department of Computer Science and Engineering

Organizing Secretaries: Dr. N. K. Nagwani and Dr. Mridu Sahu

Chairmen: Dr. Rakesh Tripathi and Dr. Dilip Singh Sisodia

Course Fee: No Registration Fee

Brief information about the event:

The application of AI and Data Science in the Earth Science is the emerging research field. These techniques can aid for detection, prediction and identification of various earth features. The advancement in intelligent computing has led to the development of tools and techniques useful for earth science and geological applications. This FDP focused on progress in artificial intelligence and machine learning tools with their application in geo science. Novel technological advances in the field and associated ethical considerations were also discussed. The objectives of this FDP were to provide an interdisciplinary forum for researchers, staff and faculty as well as delegates from industry engaged in the full spectrum of research, development, application, and to discuss the current state of the art and developments of advanced techniques to solve the recent challenges and issues.



UPCOMING EVENTS (Conference/Seminar/STTP, etc.) (Oct 2022-December 2022)

Title of event: Interviews & Group Discussions- Body Language, Gestures and Postures

Duration: January 16 - February 27, 2023 (Excluding Saturday, Sunday and National Holidays)

Organizing section: Continuing Education Cell, NIT Raipur

Organizing secretary: Dr. Chetna Sharma Rajput

Chairmen: Dr. Subhojit Ghosh

Course fee: Students of NIT Raipur: Rs. 750 + 18% GST ,Outside Students (other than NIT Raipur): Rs. 1000 + 18% GST , Faculty/ Industry Personnel: Rs. 2500 + 18% GST

Brief information about the event:

This course is proposed to specifically work towards improving noncommunicative/unspoken part of interviews. Non-verbal cues like tone, gestures, postures (body language) are ways that our bodies use to make different forms of non-verbal communication. The Mehrabian Communication Model states that, a significant percentage of a message is conveyed through nonverbal component. Hence, a premeditated effort to work upon improving the expression of noncommunicative elements becomes important. The course broadly aims to upskill learners command over intentional aspects of body language parameters; like facial expression, hand movements, eye movements, seating and standing poses, leg stances, arm movements and placements etc. The course also subjectively plans to illustrate the symmetry between gesture, posture and sentiments. They can depict confidence, an introvert/extrovert nature, submissive/assertive personalities, dominant traits of aggression or anxiety. The knowledge and assimilation of which are necessary precondition to exhibit and command interviews successfully. Lastly, this course in its very nature is more pragmatic, performance oriented and practical, as intentionally or unintentionally non-verbal communication aids to assess a lot about the prospective candidate.

Title of event: GIAN Course on Microbial electrochemical Systems as a platform technology and its emerging applications

Duration: January 16-20, 2023

Organizing department: Department of Biotechnology

Course coordinator: Dr. Pratima Gupta and Dr. Dijendra Nath Roy

Course fee: Industry/Research Organizations: Rs. 2000/- , Academic Institutions (Faculty): Rs. 1500/- , Academic Institutions (Students): Rs. 500/-,(*The fees are inclusive of 18% GST)

Brief information about the event:

Microbial electrochemical systems (MESs) are promising novel technologies that generate the energy as well as various value-added products under mild operational conditions. Microorganisms function as biocatalysts in the anodic chamber and the emitted electron flux from oxidative metabolism plays a vital role in the operation of these systems. It offers a flexible platform for both oxidation and reduction reaction-oriented processes. Bio-based economy is a global need for the production of green energy and products. Hence the microbial-derived electrochemistry sprang into Bio electrochemical Systems (BES) that exploit the process of bio electrochemical utilisation of organic matter via microbial metabolism to generate usable by-products and a great variety of applications in chemical production (microbial electrolysis cells, MECs; microbial electrosynthesis, MES), toxic compound detection (Biosensor) or water desalination (microbial desalination cells, MDCs).

Title of event: 2nd International Conference on Biomedical Engineering Science and Technology : Roadway from Laboratory to Market (ICBEST 2023)

Duration : February 10-11, 2023

Organizing department: Department of Biomedical Engineering

Organizing secretaries: Dr. Saurabh Gupta, Dr Nishant Kumar Singh and Dr. M Marieswaran

Chairman: Dr. Bikesh Kumar Singh

Course fee: Student/Research Scholars: Rs. 4000 +18% GST, Faculties: Rs. 5000 +18% GST, Industry Personnel: Rs. 6000 +18% GST

Brief information about the event:

The conference aims to provide a forum for researchers, practitioners and professionals from the industry and the academia to share their research trends, findings, and results. The conference highlights multidisciplinary perspectives to interested Biomedical Engineers, software engineers and computer professionals, medical professionals, biotechnologists, sustainability researchers etc. and also provides a platform for potential knowledge exchange on recent trends, theories, and practices in the field of medical science and engineering. Biomedical is one of the emerging fields that can add new and better applications in a wide range of sectors like healthcare, service sector, and processing industry to name some. Health research has a high value to society. The conference proposes to discuss about the advancements that enable the researchers to develop better health facilities, huge data processing techniques for medical application and non-invasive diagnosis methodology.

ARTICLES OF PRIME RELEVANCE

Nanotechnology in theranostic of Diabetes

Awanish Kumar

Department of Biotechnology, NIT Raipur

The ranostic is the combination of delivering drug i.e. therapy and then examining the effect. Although nanoparticle base drug delivery is an emerging technique but it shows a promising future. It provides opportunities for physicists, chemists and biologist to develop systems that may eventually match in sophistication and precision. The antidiabetic drug molecules can be (a) entrapped/encapsulated within the nanoparticle, (b) adsorbed physically on the surface of nanoparticle, and (c) linked to the surface of the nanoparticle chemically and could be used as nanomedicine.

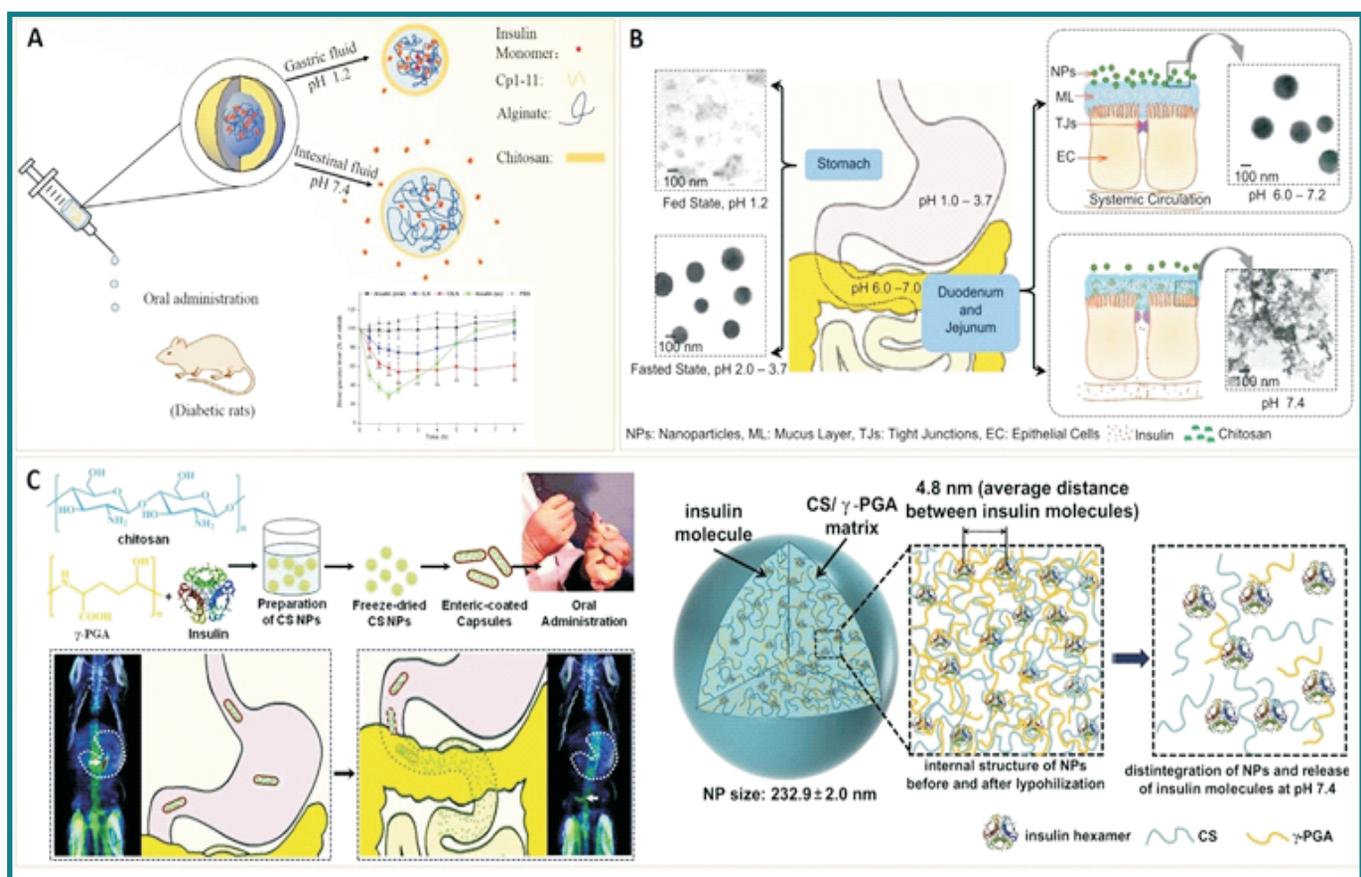


Fig.1 Schematic illustration of biopolymeric nanoparticles (NPs) as a carrier for the delivery of the insulin complex is an approach towards nanotechnology in theranostic of Diabetes. (Copyright Int. J. Pharm. 2019, 562, 23; Biomaterials 2009, 30, 2329; Biomaterials 2010, 31, 3384; Elsevier B.V.)

However, current problems for nanomedicine involve understanding the issues related to toxicity and environmental impact of nanoscale materials (materials whose structure is on the scale of nanometers, i.e. billionths of a meter). Significant challenges remain in pushing this field into clinically viable therapies. The design and testing of novel methods of controlling the interaction of nanomaterials with the body are some of the current barriers to translating these technologies to therapies.

People suffering with both type 1 and type 2 diabetes face a constant struggle to manage their condition. Diabetic condition is arisen when the pancreas is no longer able to make insulin or when the body cannot make efficient use of the insulin it does produce. Daily self-management is vital, demanding, and need regular checking of blood glucose levels. In addition, the long-term effects of high glucose levels can affect the whole body, leading to many complications such as cardiovascular disease and causing kidney, nerve, and retinal damage. Methods of targeting nanomaterials with antidiabetic drug to membranes of red blood cells and then examining the effect are major challenges that need to be addressed. Nanotechnology attains an essential place in theranostic of diabetes; however, it is still in its infancy. With sufficient time and research, the concept of theranostic in diabetes combining with nanotechnology may become a reality.

Underground mine deformation monitoring using Synthetic Aperture Radar technique: A case study of Rajgamar coal mine of Korba Chhattisgarh, India

Monika, Himanshu Govil and Subhanil Guha
Department of Applied Geology, NIT Raipur

1. Introduction

Since ancient time, mining is one of the key factors which contributes to the economic growth and development of a country. It not only contributes towards the overall GDP of India (2.2 – 2.5%), but also happens to be a major factor for the industrial GDP of India (10 – 11%). It is still considered to be one of the primary sources of energy. As a matter of fact, in India, over 60% of commercial energy is still dependent on coal. Due to its significance in the Indian economy, it has also been named “Black Gold”.

Coal mines are the major source of energy in industries and are important indicators of the economic growth of a country. Excessive withdrawal of coal from the underground coal mines without stowing leads to surface deformation. In this study, Synthetic Aperture Radar technology has been used to identify the surface deformation' in the Korba Coal Mines of India. Korba coal mines are major coal-producing mines in India that come under South Eastern Coalfields Limited (SECL). It covers three underground mines. Depillaring has been done through the caving method, which may lead to deformation of the area and its surroundings. Deformation may have devastating consequences if overlooked. So, it requires continuous monitoring over the area. Space-based SAR interferometry is the most preferred technique to monitor any mining area over a period of time. In this technique, known as the DInSAR technique, a deformation map can be generated from images of the same area acquired over different points of time.

In the present study, images of the month of February of the years 2015, 2016, 2017 and 2019 have been successfully utilized for DInSAR analysis over the Rajgamar area. The Interferogram allows analysis of an entire mine site including pits and their surrounding area. High precision monitoring over wide coverage enables to bring out accurate deformation results due to the presence of coherent targets and monitor risk across the study area. Maps generated from data were scrutinized and interpreted. Consequentially, 2015-2016 shows greater deformation than the other two corresponding maps generated 2015-2017 and 2015-2019 data. Results were validated through ground observations. Overall the area of the Rajgamar coal mine is getting deformed at a slow rate.

2. Study area

Rajgamar coal reserve comes under the Korba coalfields of Chhattisgarh. This region comes under Barakar formation, Damoda Group, Lower Gondwana. It comes under Korba coalfield, which lies between $22^{\circ} 25' 10''$ N to $22^{\circ} 22' 57''$ N; $82^{\circ} 50' 06''$ E to $82^{\circ} 51' 42''$ E under Survey of India toposheet No. 64J14 and 64J15 of R.F. 1:50000.

Three underground mines R-4/5 Incline, R-6/7 Incline and Pavan Incline have area coverage of 1515 hectares, 1815 hectares and 228 hectares respectively. Pulandi Nala divides R-4/5 and R-5/6 and Groma Nala separates R-4/5 and Pavan. Depillaring in R- 4/5, R- 5/6 and Pawan by the caving method was initiated in 1983, 1995, and 2003 respectively. The Rajgamar coal mines also contribute to the economy of SECL through export. Coal is transported via Korba railway station, which is approx. 50 km away from the mining location.

3. Results

The initial interferograms are shown in Figure 1. 'B', 'C' and 'D' (i.e., 2015 vs. 2016, 2015 vs. 2017 and 2015 vs. 2019). Deformation signatures derived from the interferograms.

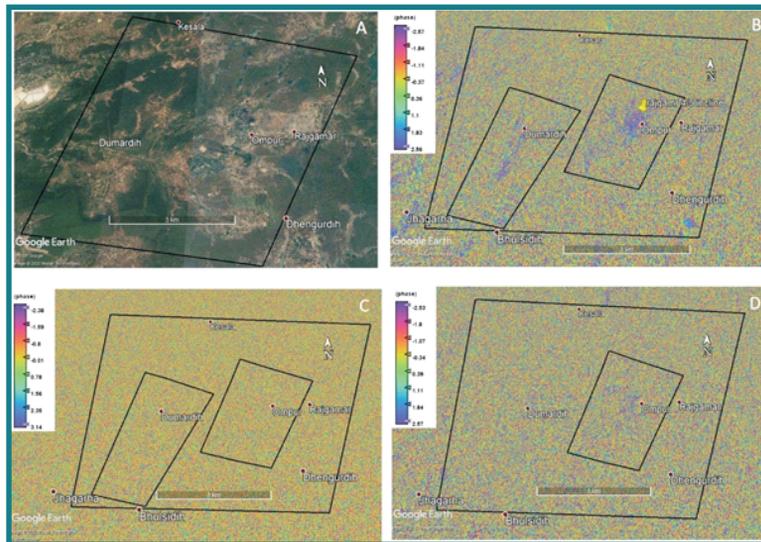


Fig 1 Rajgamar mines and surrounding areas, which is the area under investigation enclosed by polygon (A) Google Earth image (B) Interferogram map generated using 2015 – 16 data (C) Interferogram map generated using 2015 – 17 and (D) Interferogram map generated using 2015 – 19 data over Rajgamar area.

3.1 Rajgamar - 4/5 mine observation for deformation

The whole area was affected because of the caving restoring method. The first major deformation was reported in 1984 at a location $22^{\circ}23'15.52''$ N and $82^{\circ}49'32.77''$ E, which is nearly 500 meters from the main R-4/5 mine. Another point $22^{\circ} 23' 29.99''$ N and $82^{\circ} 49' 41.52''$ E was described by the survey officer and through collection of ground data it was confirmed that cracks were present as evidence of deformation opposite Shanti Nagar Basti of Rajgamar area.

3.2 Rajgamar - 6/7 mine observation for deformation

This mine is located at a distance of approx. 5 km from R-4/5. Presently, this mine is closed due to some pending environmental issues. In this region, the land subsided in the form of sag, pit and cracks, which developed over time due to the extraction of coal.



Fig. 2 Photographs of sag identified in the Rajgamar - 6/7 mine area of Chhattisgarh. (1, 2) are sags, which store water in the rainy season, while (3 to 5) are subsided land.

3.3 Pavan mine observation for deformation

This mine is approx. 5 km away from the R-6/7 and approx. 3 km from R-4/5. Deformation has been identified at location $22^{\circ} 22' 31.04''$ N and $82^{\circ} 49' 37.74''$ E near Gurma village, which has been affected by depillaring done in the surrounding areas. This mine was closed in 2011 by the caving method. Only 30 percent reserve was left under the villages in the mining area. The whole area is hollow and not filled by any material, i.e. restoring was done by the caving method, which led to high deformation in this area. Sag and potholes both are identified at a location $22^{\circ} 22' 32.85''$ N, $82^{\circ} 17' 16.87''$ E, which has been shown in Figure 3 respectively. back. The area needs continuous observation.



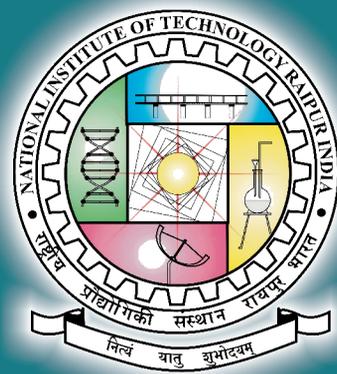
Fig. 3 In Pavan mine photographs of sagging area(left) a large area subsided, trees are also tilted due to deformation(middle and right) due to mining and dislocation of surface strata of Rajgamar coalfield of Chhattisgarh.

4. Conclusions

Present study shows that potential of SAR data and DInSAR technique is suitable for deformation monitoring. The area in and around the Rajgamar coal field has been undergoing deformation in the form of large sag, potholes and cracks.

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