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QUARTERLY R&D Newsletter

Dibrugarh University

Quarterly Research and Development Newsletter

DIBRUGARH UNIVERSITY

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This issue covers Research & Development activities of Dibrugarh University for the Period of 1st October-31st of December, 2022.

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***FACULTY OF
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Research Articles Published in Journals

1. L. Gogoi, J. Gogoi, R. Chetia, M Chamua , S, Konwar and P. K. Saikia. **Role of concentration on $Cd_xPb_{1-x}S$ thin films: synthesis, characterization and photovoltaic cells properties.** *Bull. Mater. Sci.* (2022) 45:220, [https:// doi.org/ 10.1007/ s12034-022-02801-6](https://doi.org/10.1007/s12034-022-02801-6).

Abstract:

The $Cd_xPb_{1-x}S$ thin films with different concentrations of x from 0.2 to 0.8 were synthesized using the chemical bath deposition method. X-ray diffraction (XRD) and Williamson–Hall (W–H) plot gives the crystallite size that decreases with increased concentration. XRD, high-resolution transmission electron microscopy and selected area electron diffraction patterns of the film samples evidence the hexagonal phase structures of both CdS and PbS. Energy-dispersive X-ray confirmed the presence of Cd, Pb and S in the film samples. The transmittance of the film samples increases with the increase in concentration. Optical studies show the prominent blue shift in bandgap energy, whereas the Urbach energy decreases with the increased concentration x. The electrical conductivity of the films at room temperature is of the order of $10^{-5} (Xcm)^{-1}$. The efficiency of the heterojunction cell structures $Cd_xPb_{1-x}S/CdTe$ and $Cd_xPb_{1-x}S/CdSe$ are calculated to be 3.37 and 2.21%, respectively. **Keywords.** $Cd_xPb_{1-x}S$; XRD; HRTEM; Urbach energy; electrical conductivity; photovoltaic cell.

2. R Karmakar, DJ Gogoi, UD Goswami, *Quasinormal modes and thermodynamic properties of GUP-corrected Schwarzschild black hole surrounded by quintessence,* **International Journal of Modern Physics A 37 (28n29), 2250180.**
3. J Bora, UD Goswami , *Radial oscillations and gravitational wave echoes of strange stars with nonvanishing lambda,* **Astroparticle Physics 143, 102744.**
4. Jhorna Borah, Uddit Narayan Hazarika, Prithiviraj Khakhlyar, **Extending the Chemistry of Reaction between BODIPY and Cyanide Ions: An Application in Selective Sensing of Fluoride and Cyanide Ions,** *ACS omega, 7.*

Abstract:

A novel colorimetric BODIPY-based probe for selective detection of fluoride and cyanide has been developed. The color of the solution significantly changes upon addition of fluoride and cyanide ions with detection limits of 2.2×10^{-7} and 1.8×10^{-7} M calculated by UV-vis absorption method for F^- and CN^- respectively. An unprecedented phenomenon about the interaction of cyanide ions with the probe was discovered which has not been reported yet. The green color of the paper strip in the presence of cyanide ions changes with time. This observation indicates that unlike fluoride, the cyanide ion interaction with the probe is beyond mere deprotonation of the phenolic group rather envisaged as nucleophilic addition reaction. The phenomenon was also observed in the solution phase and subsequently the reaction order and rate constant of the reaction were determined from absorption versus time graph which were found to be first order and 0.3465 s^{-1} respectively. The emission spectra also showed different behavior of interaction with time for the two ions. The rate of the reaction was found to be independent of the solvent polarity. The plausible mechanism of the reaction between cyanide and fluoride ions with the probe was proposed based on ^1H NMR titration experiments and mass spectrometry.

5. Jhorna Borah, Aziza Rahman, Anupaul Baruah, Pankaj Dutta, Prithiviraj Khakhary, **8-Hydroxyquinoline-BODIPY based dual mode pH probe: Intuits acidic and basic environments through two different mechanisms**, *Journal of Photochemistry and Photobiology A: Chemistry*, 437.

Abstract:

A new BODIPY based optical pH probe that effectively distinguishes acidic and basic solutions through opposite fluorescence responses was designed and subsequently synthesized. The fluorescence response in basic medium was governed by photoinduced electron transfer (PeT). Effective PeT quenched the emission of the probe in basic pH while it was inhibited in acidic pH. The visible colour change on addition of acidic and basic solutions enabled naked eye detection of pH. Comparing the optical property of this probe with other analogous compounds it was realized that substituent at BODIPY has significant impact on possibility of PeT from excited BODIPY moiety. Electron donating substituent facilitates the d-PeT (donor) of excited BODIPY moiety and absence of which inhibits such transition. These experimental observations were validated with theoretical study. The mechanism of pH sensing was also investigated by ^1H NMR titration experiment. Interestingly, probe was found to be responsive to pH change in the entire range of pH. Moreover, the probe can reversely detect the pH change through absorption which allows extension of pH sensing in real life samples.

6. Jasmin Sultana, Bidyutjyoti Dutta, Sanjay Mehra, Shahnaz S. Rohman, Arvind Kumar, Ankur K. Guha, Diganta Sarma. **SCuNPs-Catalyzed Solventless Oxidative**

[3+2] Azide-Olefin Cycloaddition: An Efficient Protocol for Di- And Trisubstituted 1,2,3-Triazole Synthesis. *Chemistry Select, Volume: 7.*

Abstract:

A starch capped copper nanoparticles (SCuNPs) promoted solvent free methodology has been developed for oxidative [3+2] azide-olefin cycloaddition reaction. The reactions employ atmospheric O₂/DMSO as oxidant to furnish an assortment of disubstituted and trisubstituted 1,2,3-triazoles. This method is well-suited not only with acyclic terminal olefins, but also with cyclic and open chain internal olefins. The proposed mechanism was validated with the help of DFT calculations. The triazole formation proceeds through exergonic pathway and the activation barriers are not very high which helps in the easy formation of triazole derivative.

7. Jasmin Sultana, Anirban Garg, Akshay Kulshrestha, Shahnaz S. Rohman, Bidyutjyoti Dutta, Kuldeep Singh, Arvind Kumar, Ankur K. Guha, Diganta Sarma. **Zn@CS: An Efficient Cu-Free Catalyst System for Direct Azide-Alkyne Cycloadditions and Multicomponent Synthesis of 4-Aryl-NH-1,2,3-triazoles in H₂O and DES. *Catalysis Letters, Volume: 2022.***

Abstract:

A highly efficient recoverable and reusable heterogeneous Zn-catalyst, chitosan supported ZnSO₄ · 7H₂O (designated as Zn@CS) is synthesized via a simple synthetic route. Low catalyst loading, need of aqueous reaction media and sharp reduction of time requirement in comparison to the previously reported methodologies are some special features of the established Zn catalyzed direct azide-alkyne cycloaddition reaction. Zn@CS-catalyst is also suitable for multicomponent synthesis of 4-aryl-NH-1,2,3-triazoles from different derivatives of benzaldehyde. An inexpensive and environmentally benign deep eutectic solvent (DES), ChCl:PEG-400:Glycerol as a suitable reaction media accelerates these reactions leading to excellent yields of NH-triazoles. Based on literature report a plausible mechanism has been suggested for ZnAAC reaction.

8. Priyanka Gogoi, Bishal Bhattacharyya, Vishal Chakravorty, Anirban Garg, Priyanuj Krishnann Hazarika, Kalyanjyoti Deori, Diganta Sarma. **Hydrothermally Developed**

ZnC₂O₄.2H₂O Nanocrystals as Efficient Copper-free Catalyst for the Synthesis of 1,4-Disubstituted 1,2,3-Triazoles in Water. *ChemNanoMat*.

Abstract:

In this work, we report the synthesis of nanostructured ZnC₂O₄.2H₂O with irregular sheet-like morphology using a simple hydrothermal procedure. The as-synthesized ZnC₂O₄.2H₂O nanocrystal (ZnC₂O₄ NC) is very stable and therefore, explored for the first time as highly efficient recyclable catalyst for the azide-alkyne cycloaddition (AAC) reaction. Our catalytic protocol is highly efficient and amenable to a variety of aromatic/aliphatic azide and alkyne substrates under mild reaction condition to afford regioselective 1,4-disubstituted 1,2,3-triazoles with good to excellent yields. Also, for the one pot synthesis of desired products, the developed method is exceedingly sustainable where azides are formed in-situ from their respective precursors. Our catalytic results outperformed most of the reported state-of-the-art works involving copper free nanoparticulate and zinc-based catalysts. All the original features of the recovered catalyst remained intact after 5th catalytic cycle which clearly suggests the efficiency of the Zn-based stable nanostructured material as alternative copper free catalysts for AAC reactions. The developed methodology could be extended for gram-scale synthesis of 1,2,3-triazoles.

9. Nilakshi Dutta, Bidyutjyoti Dutta, Apurba Dutta, Bipul Sarma and Diganta Sarma. **Room temperature ligand-free Cu₂O–H₂O₂ catalyzed tandem oxidative synthesis of quinazoline-4(3H)-one and quinazoline derivatives. *Organic & Biomolecular Chemistry*.**

Abstract:

An efficient and simple copper catalytic system has been developed for the synthesis of medicinally important 2-substituted quinazoline-4(3H)-ones from 2-aminobenzonitrile and benzyl alcohol derivatives and additionally 2-substituted quinazolines from 2-aminobenzylamine and benzaldehyde derivatives. Mild oxidant H₂O₂ was utilized, providing excellent product yields. The molecular structure of one of the compounds was substantiated through SC-XRD. The versatility of the protocol was demonstrated through gram-scale syntheses.

10. Gohain, B., Chutia, R., & Dutta, P. **A distance measure for optimistic viewpoint of the information in interval-valued intuitionistic fuzzy sets and its applications. *Engineering Applications of Artificial Intelligence*, 119, 105747.**

11. Borah, G., & Dutta, P. (2022). **Aggregation operators of quadripartitioned single-valued neutrosophic Z-numbers with applications to diverse COVID-19 scenarios.** *Engineering Applications of Artificial Intelligence*, 105748.
12. Talukdar, P., Dutta, P., & Goala, S. (2022). **Cognitive Decision-Making Based on a Non-linear Similarity Measure Using an Intuitionistic Fuzzy Set Framework.** *Cognitive Computation*, 1-18.
13. Dutta, P., & Limboo, B. (2022). **A new association coefficient measure for the conflict management and its application in medical diagnosis.** *International Journal of Information Technology*, 14(7), 3767-3779.
14. Dutta, P., & Borah, G. (2022). **Multicriteria group decision making via generalized trapezoidal intuitionistic fuzzy number-based novel similarity measure and its application to diverse COVID-19 scenarios.** *Artificial Intelligence Review*, 1-75.
15. Gohain, B., Chutia, R., & Dutta, P. (2022). **Discrete similarity measures on Pythagorean fuzzy sets and its applications to medical diagnosis and clustering problems.** *International Journal of Intelligent Systems*, 37(12), 11622-11669.
16. Goala, S., Dutta, P., & Limboo, B. (2022). **Crime Prediction via Fuzzy Multi-Criteria Decision-Making Approach Under Hesitant Fuzzy Environment.** *In Advanced Applications of Computational Mathematics (pp. 171-182). River Publishers.*
17. Sarmah A., Rehman R., Mahanta P., Dutta K., Bordoloi K., Borah K., Singh H. **A Novel Approach for Automatic Speaker Identification of Assamese Language Using Cosine Similarity and Absolute MFCC Feature Matrix.** *Journal of Theoretical and Applied Information Technology (2022), Volume 100, Issue 21, pp. 6552 – 6560.*

Abstract:

Automatic speaker Identification (ASI) is always challenging work for researchers. ASI is a process where a speaker is recognized automatically from his/her voice sample by comparing it with their previously recorded voices. The machine learning approach has been gaining popularity in recent years for ASI. Different machine learning approaches used in ASI in recent years are Convolutional Neural Network (CNN) [14,15,16], Deep Neural Network (DNN) [10,11,12,13], Artificial Neural Network (ANN) [17,18]. This research aims to build an automatic speaker identification system for the Assamese language, which is spoken in the North-Eastern part of India and is one of the low-resource languages. So far, cosine similarity and parallel processing methods have not been used for speaker identification in the Assamese Language, which is the novelty of the current work. The model developed in this work uses Mel-frequency cepstral coefficient (MFCC) to

extract important features of speakers' voices to create a training sample set in the first phase. In the present approach, we have used the Speaker's absolute feature vectors (MFCC) directly, without any averaging, in order to retain and exploit the Speaker's unique characteristics. In the second phase, the features in the training sample set of the first phase are compared with the real-time test voice samples using the cosine similarity method to identify the Speaker automatically. Parallel processing is used to compare all the coefficients in the test voice sample with the training voice sample to make the system faster. The effectiveness of the proposed method has been established in terms of precision, recall, f1 score, and accuracy value. The model demonstrated an accuracy of 91% for speaker identification in the Assamese language.

18. Iqbal MS, Ahmad W, Alizadehsani R, Hussain S, Rehman R. **Breast Cancer Dataset, Classification and Detection Using Deep Learning.** *Healthcare.* 2022; *Volume 10, Issue 12.* <https://doi.org/10.3390/healthcare10122395>.

Abstract:

Incorporating scientific research into clinical practice via clinical informatics, which includes genomics, proteomics, bioinformatics, and biostatistics, improves patients' treatment. Computational pathology is a growing subspecialty with the potential to integrate whole slide images, multi-omics data, and health informatics. Pathology and laboratory medicine are critical to diagnosing cancer. This work will review existing computational and digital pathology methods for breast cancer diagnosis with a special focus on deep learning. The paper starts by reviewing public datasets related to breast cancer diagnosis. Additionally, existing deep learning methods for breast cancer diagnosis are reviewed. The publicly available code repositories are introduced as well. The paper is closed by highlighting challenges and future works for deep learning-based diagnosis.

19. Prof. N.K.Gogoi and Dr. Chusmita Konwar, *Flood Hazards And Their Associated problems: A Case Study*, *Journal of Emerging Technologies and Innovative Research*, Volume: 9 (12) , December 2022, ISSN: 2349-5162.

20. Sharma, M. (2022). **Epidemiologic Risk Factors for Variation in Age at Natural Menopause: Shreds of Evidence from a Tribal Community in North-East India.** *The Oriental Anthropologist*, 22(2), 293–312.<https://doi.org/10.1177/0972558X2211228332>.

Abstract:

In the coming decades, the proportion of Indian women aged 45 years and above is anticipated to rise dramatically and, women could expect to spend nearly 30 years in the post-menopausal years. There is scanty menopausal research to identify the risk factors of early and late menopause in North-East India. This research was conducted in the rural

parts of the flood-prone area of Dhemaji district of Assam in North-East India in 2017. Five hundred sixteen women aged 43–61 years were found eligible to participate in the study (response rate 93.48%). Women were categorized into four groups based on menopausal age: early menopausal (40–44 years), relatively early menopausal (45–49 years), 50–51 years (reference category), and 52 years and above as late menopausal. 15.12% women reported being early menopausal. In univariate analysis, statistically significant association was found between age at menopause and occupational status, age at sexual union, age at first and last childbirth, oral contraceptive pills (OCPs) used, nulliparity, regular consumption of traditional rice beer, mother's age at menopause, and high levels of chronic and routine stress. Multiple regression analysis revealed occupation, mother's natural menopausal age, age at first sexual entry, regular consumption of traditional rice beer, moderate to high levels of routine and chronic stress, age at last birth, acceptance of OCPs for at least 5 years, and parity as potential epidemiologic risk factors of early and late menopause.

21. Daalima Goswami and Jiten Hazarika. **Trend and time series cluster analysis of crime incidences in India using dynamic time wrapping and hierarchical clustering method.** *Int.J.Agricult.Stat.Sci. Volume 18 No 2 pp 499-506, 2022.*
22. Naina Purakayastha, Preeti Dhillon, Balhasan Ali and Jiten Hazarika. **Changing Patterns of One-Person and One-Couple Only Households in India.** *Journal of Population Ageing (2022).*
23. Rituraj Neog and Jiten Hazarika. **Thermal stress and urban heat island effect in Jorhat urban environment as a result of changing land use and land cover.** *Acta Geophysica.* [https://doi.org/10.1007/s11600-022-00927-z.](https://doi.org/10.1007/s11600-022-00927-z)

Conference Papers

1. Bidyutjyoti Dutta, Diganta Sarma. **Designing a Task-Specific Ionic Liquid for Synthesis of Quinazolinones via Multiple Pathways.** *Souvenir of the conference on Science for Society, Environment and Sustainability.* Editors: Dr. Binoy K Saikia, Dr. Lakshi Saikia, Dr. Rituraj Konwar, Dr. Swapnali Hazarika, Dr. Tonkeswar Das, Mr. Shahadev Rabha, Mr. Debashis Sarmah. *Publishers: Director, CSIR-NEIST, Jorhat and Organizing Committee, SSES-2022 National Conference.*

Abstract:

Ionic Liquids (ILs) have been attaining much interest in synthetic organic chemistry as well as the pharmaceutical industry from researchers as an alternative to volatile organic solvents due to their unique physicochemical properties. A new bifunctional IL is designed in this work to access medicinally important quinazolin-4(3H)-one derivative from three different pathways i.e., microwave, thermal, and photochemical precluding the use of any external acid, metal, ligand, and catalyst. This IL has worked as catalyst cum solvent to attain quinazolin-4(3H)-ones from anthranilamide and benzyl alcohol derivatives through one pot oxidative synthesis in 3.5 minutes under microwave irradiation, photochemically in 4 hours at room temperature and thermally in 8 hours at a temperature of 120 °C. Moreover, the neat synthesis of 1,2,4-triazolo quinazolinone derivatives under microwave irradiation which are the potent Wnt pathway antagonists through the designed ionic liquid establish the significant multifunctionality and task specificity of the IL.

2. Nilakshi Dutta, Diganta Sarma. **Development of an efficient Copper catalytic system for tandem oxidative synthesis of Quinazolinones and Quinazolines.** *Souvenir of the conference on Science for Society, Environment and Sustainability.* Editors: Dr. Binoy K Saikia, Dr. Lakshi Saikia, Dr. Rituraj Konwar, Dr. Swapnali Hazarika, Dr. Tonkeswar Das, Mr. Shahadev Rabha, Mr. Debashis Sarmah. *Publishers: Director, CSIR-NEIST, Jorhat and Organizing Committee, SSES-2022 National Conference.*

Abstract:

Quinazolinone derivatives are an important cluster of nitrogen heterocycles that are potentially associated with drug discovery. In this report, we have designed a simple and mild copper-based catalytic system for the synthesis of medicinally potent 2-phenyl quinazolin-4(3H)-ones and 2-phenyl quinazolines. 2-aminobenzonitrile with benzyl alcohols have been taken as model substrates for effective synthesis of a series of

quinazoline-4(3H)-ones including existing drug molecules under ligand-free conditions. In addition, ortho-substituted quinazolines were synthesized from 2-aminobenzylamine and benzaldehyde derivatives. Unlike reported procedures, reactions were effectively preceded at room temperature by the use of green oxidant H₂O₂. Furthermore, three-gram scale syntheses of 2-phenyl quinazoline-4(3H)-ones were carried out with satisfactory yields that signify the synthetic utility of the protocol. To the best of our knowledge, this is the simplest protocol for the copper-catalyzed tandem oxidative synthesis of 2-phenyl quinazoline-4(3H)-ones as well as 2-phenyl quinazolines under mild conditions to date.

3. Roktopol Hazarika, Diganta Sarma. **ZnFe₂O₄/PEG: Versatile Catalytic System for the Synthesis of N-Unsubstituted 1,2,3-Triazole with Theoretical Mechanistic Approach.** *Souvenir of the conference on Science for Society, Environment and Sustainability.* Editors: Dr. Binoy K Saikia, Dr. Lakshi Saikia, Dr. Rituraj Konwar, Dr. Swapnali Hazarika, Dr. Tonkeswar Das, Mr. Shahadev Rabha, Mr. Debashis Sarmah. *Publishers: Director, CSIR-NEIST, Jorhat and Organizing Committee, SSES-2022 National Conference.*

Abstract:

Quinazolinone Triazole molecules resemble the amide bond which makes them a privileged molecular entity for successful exploitation in medicinal chemistry such as anticancer drugs, and antibacterial and anti-TB agents. 4-Aryl-NH-1,2,3-triazoles are recognized as an important class of 1,2,3-triazoles and receive tremendous attention for years due to their numerous biological properties. The synthetic procedures for N-unsubstituted triazoles are fairly challenging compared to the N-substituted triazoles, with little literature available which are based on metal catalysis, 1,3-dipolar cycloaddition, multicomponent reaction, and heterogeneous catalyst. Therefore, we have tried to feature easily available starting materials viz. aldehyde, nitroalkane, and NaN₃ for the synthesis of 4-Aryl-NH-1,2,3-triazoles by employing a low-cost, sustainable catalytic system based on zinc ferrite in combination with PEG400. This catalytic system provides a wide range of substrate studies along with large-scale syntheses of the desired product. Moreover, the procedure can be successfully employed for the synthesis of medicinally important NH-triazole molecules. Moreover, the mechanism of the metal-catalyzed reaction is studied and further validated by theoretical analysis.

4. Priyanka Gogoi, Kalyanjyoti Deori, Diganta Sarma. **Zinc oxalate nanocrystals as recyclable catalyst for regioselective 1,2,3-triazole synthesis: a strategy towards copper-free click chemistry.** *Souvenir of the conference on Science for Society, Environment and Sustainability.* Editors: Dr. Binoy K Saikia, Dr. Lakshi Saikia, Dr. Rituraj Konwar, Dr.

Swapnali Hazarika, Dr. Tonkeswar Das, Mr. Shahadev Rabha, Mr. Debashis Sarmah.
Publishers: Director, CSIR-NEIST, Jorhat and Organizing Committee, SSES-2022 National Conference.

Abstract:

Quinazolinone Replacing copper-based catalysts for the regioselective synthesis of 1,4-disubstituted 1,2,3-triazoles has been a major trend globally. Copper-catalyzed click chemistry introduced by Sharpless for the first time in 2001 offers one of the most supreme organic transformations to synthesize regioselective 1,2,3-triazoles in one go. Though, the incompatibility of copper in living systems when applied in bulk is considered to be one of the major reasons for searching for a better alternative for the reaction. Hydrothermally derived nanostructured $ZnC_2O_4 \cdot 2H_2O$ with irregular sheet-like morphology is found to be a highly efficient and amenable heterogeneous catalyst for azide-alkyne cycloaddition (AAC) reaction to afford 1,4-disubstituted 1,2,3-triazoles. The catalytic efficiency of the aforementioned catalyst outperformed most of the reported state-of-the-art works involving copper-free nano particulates and zinc-based catalysts. The as-prepared catalyst remained intact after the 5th catalytic cycle without losing its efficiency and structural morphology, also shows a wide substrate scope which suggests the efficiency of the Zn-based stable nanostructured material as alternative copper-free catalysts for AAC reactions.

5. Dutta, K., Rehman, R., Mahanta, P., Sarmah, A. (2022). A Study on Feature Selection for Gender Detection in Speech Processing for Assamese Language. Information, Communication and Computing Technology. ICICCT 2022. *Communications in Computer and Information Science, vol 1670. Springer, Cham.* https://doi.org/10.1007/978-3-031-20977-2_6.

Abstract:

Gender identification is an integral part of a Speech recognition system. Specifically, for the low resource languages, it is a challenging task. For any speech recognition system, finding a suitable feature plays an essential role in the system's performance. In this paper, we have done a comparative analysis of gender identification from formant frequencies F1 and F2 of speech data set collected from the speakers of Assamese language (a low resource language of North-East India). The objective is to explore different classification techniques for developing a gender identification module for Assamese language. We have used four supervised classification techniques kNN, Logistic Regression, decision tree, and SVM, and found that when F1 and F2 are used together, the methods give the best result. One unsupervised method Gaussian Mixture Model (GMM) is also applied and found that the best result is given by formant frequency F1.

Published Book Chapters

1. **Dutta, P., Saikia, B. Dice Similarity Measure for Fuzzy Numbers and its Applications in Multi-criteria Decision Making and Pattern Recognition.** *In: Gyei-Kark, P., Jana, D.K., Panja, P., Abd Wahab, M.H. (eds) Engineering Mathematics and Computing. Studies in Computational Intelligence, vol 1042. Springer, Singapore. https://doi.org/10.1007/978-981-19-2300-5_51.*

Awards and Recognition received by group members

1. **Ms Lipika Gogoi**, a research scholar at Department of Physics, working under the supervision of Prof. Prasanta Kumar Saikia, **was awarded PhD** for her thesis entitled **“Optical and structural characterization of $Cd_{1-x}Zn_xS$ and $Cd_xPb_{1-x}S$ nanocrystalline thin films prepared by CBD technique for Photovoltaic applications”** .
2. **Jasmin Sultana**, a research scholar working under the supervision of prof. Diganta Sarma **was awarded Ph.D. on 01/12/2022 by Dibrugarh University.**
3. **Bidyutjyoti Dutta**, a research scholar working under the supervision of Prof. Diganta Sarma **was awarded the Best Poster Award in the National Conference on Science for Society, Environment and Sustainability (SSES-2022) organized by NEIST, Jorhat, Assam from November 24th to 26th ,2022.**

***FACULTY OF
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Published Books

1. Lahiri, S.K. 2022. **The Brahmaputra River in Assam: Geomorphology, Hazards, and Natural Resources (1st ed.)**.CRC Press, Taylor & Francis Group, United Kingdom,ISBN: 9781032298528

Brief Note:

This holistic book covers the richest area in North East India in terms of both explored and foreseen reserves of fossil fuels and other natural resources. Using a multidisciplinary approach, GIS, and geospatial data gathered from different case studies included, this book helps readers develop a thorough understanding of a highly dynamic big river, the Brahmaputra, and use it as a comprehensive resource for further understanding the science of rivers. It discusses the causal factors of decadal-scale fluvial dynamics, the nature of fluvial dynamics, lateral variability of the older flood plains and Neotectonics in the shallow subsurface, and the overall trend of basin evolution at different depths.

Awards and Recognition

1. Prof. Tapos Kumar Goswami, Professor, Department of Applied Geology, Dibrugarh University has been:

- **Nominated as a Counsel Member of Structural Geology and Tectonics Studies Group India.**
- **Nominated as an Associate Editor of the Indian Journal of Geoscience, Published by Geological Survey of India.**
- **Invited as an External Expert for the annual term review meeting of Geological Survey of India at GSI NER Shillong on 21-12-2022.**

2. Dr. Devojit Bezbaruah, Assistant Professor of department of Applied Geology has been appointed as a member, Editorial Board, Asian Journal of Earth Science, Elsevier.

3. Dr. Geetartha Dutta, Assistant Professor of department of Applied Geology has been awarded a Postdoctoral Research Fellowship from the European Research Consortium for Informatics and Mathematics (ERCIM) to conduct 1-year postdoctoral research at the Norwegian University Of Science And Technology (NTNU), Trondheim, Norway.

PhDs Awarded

Name of the research scholar	Supervisor	Topic	PhD Award date
Mr. Abhijit Gogoi, Department of Applied Geology.	Prof. Dilip Majumdar, Department of Applied Geology.	Geodynamic Evolution of Mafic and Felsic Magmatism in Parts of Northern Karbi Hills, NE India: Impact on Metallogeny.	07.10.2022
Ms. Abhilekha Devi, Department of Applied Geology.	Prof. Dilip Majumdar, Department of Applied Geology.	Studies on the Geology of Lakadong-Therria Sandstone in Parts of Upper Assam Basin with Special Reference to Their Depositional Environment and Geothermal Energy Resource.	07.10.2022
Ms. Joyamoni Mout, Department of	Prof. Ranjan Kumar Sarmah, Department of Applied	Petrography, Clay Mineralogy And Source Rock Characterisation Of The Kopili Formation From Parts Of	07.10.2022

Applied Geology.	Geology.	North Cachar Hills, Assam, India.	
Ms. Nishanta Sahariah , Department of Applied Geology.	Prof. Pramathesh Bhattacharyya, Department of Applied Geology.	Petrography, Geochemistry and Clay Mineralogy of Tura Formation in Parts of the Upper Assam shelf.	07.10.2022
Mr. Parakh Protim Phukan, Department of Applied Geology.	Prof. Pradip Borgohain, Department of Petroleum Technology	Diagenetic History, Geochemistry and Depositional Setting of the Barail and Surma Group of Rocks of Champhai District, Mizoram.	07.10.2022
Mr. Kashyap Borgohain, Department of Applied Geology.	Prof. Ranjan Kumar Sarmah, Department of Applied Geology,	Sedimentological and Geochemical Studies of the Bhuban Formation from parts of Unakoti and North Districts, Tripura, India'.	01.12.2022

FACULTY OF
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Research Articles Published in Journals:

1. Challeng, N., Puzari, M., Chetia, P. and Tamuly, C. 2022. **Phenolic compounds of *Zanthoxylum armatum* DC as potential inhibitors of urease and SARSCoV2 using molecular docking approach and with simulation study.** *Natural Product Research*, August 15:1-5.

Abstract:

The anti-urease effects of active extract and three isolated phenolic compounds viz., chlorogenic acid, trans-ferulic acid, and gallic acid of leaves of *Zanthoxylum armatum* DC were evaluated. The compounds were identified based on HPLC-PDA, HR-MS, and NMR analysis. Molecular docking analysis revealed that these compounds significantly interacted with *Helicobacter pylori* urease and SARS-CoV2 vital proteins. Chlorogenic acid was found to show the strongest interaction with the *H. pylori* urease and coronavirus main protease (Mpro, also called 3CLpro), while gallic acid with five spike proteins (Cathepsin L) of SARS-CoV2. The compounds were checked for their drug-likeness character and were found to pass the Lipinski filter and abide by Veber's rule and passed through ADMET. Chlorogenic acid was simulated for 50 ns using GROMACS. The study shows that chlorogenic acid isolated from *Z. armatum* could be a significant antagonist of the *H. pylori* urease.

2. Dutta, A., Trivedi, P., Gehlot, P.S., Gogoi, D., Hazarika, R., Chetia, P., Kumar, A., Chaliha, A.K., Chaturvedi, V. and Sarma, D. 2022. **Design and Synthesis of Quinazolinone-Triazole Hybrids as Potent Anti-Tubercular Agents.** *ACS Appl. Bio Mater*, 5 (9): 4413–4424.

Abstract:

A straightforward and convenient methodology has been developed for the reaction of 2-aminobenzamide and carbonyls affording 2,3-dihydroquinazolin-4(1H)-ones using aqueous solution of [C12Py][FeCl3Br]. The developed methodology was applied for the synthesis of 25 quinazolinone-triazole hybrids followed by evaluation of their in vitro anti-tubercular (TB) activity. The results revealed that 8 quinazolinone-triazole hybrids displayed promising activity having MIC values of 0.78–12.5 µg/mL. The compound 3if with MIC 0.78 µg/mL was found to be the lead nominee among the series, better than Ethambutol, a first line anti-TB drug and comparable with Rifampicin. The active compounds with MIC values \leq 6.25 µg/mL were subjected to in vitro cytotoxicity and found nontoxic. In drug–drug interaction, compounds 3ia and 3ii interacted synergistically with all the three anti-TB drugs, INH, RFM, and EMB. Other 3 compounds interacted either in synergistic or additive manners. Important information on the binding interaction of the target compounds with the active sites of 1DQY Antigen 85C from Mycobacterium tuberculosis and Enoyl acyl carrier protein reductase (InhA) enzymes was obtained from molecular docking studies. Screening of the drug-likeness properties and bioactivity score indicates that synthesized molecules could be projected as potential drug candidates. Based on the current study, quinazolinone-triazole hybrids framework can be useful in drug development for TB.

3. Nath, R., Tamuly, D., Sharma, G.D.and Barooah, M.2022. **Effect of endophytic bacterial consortium isolated from tea (*Camellia sinensis* (L.) O. Kuntze) roots on growth and yield of *Phaseolus vulgaris* L. *Eco. Env. & Cons*, 28 (December Suppl. Issue) : S122-S133.**

Abstract:

This paper deals with the isolation of endophytic bacteria from roots of tea (*Camellia sinensis* (L.) O. Kuntze) shrubs of upper Assam, India, and evaluates their potential for promoting plant growth in-vitro. Out of forty bacterial isolates, *Bacillus cereus*, *Bacillus flexus*, *Pseudomonas sp.*, and *Pseudomonas rhodesiae* were most effective in mineral solubilization and plant growth-promoting hormone production.

Pseudomonas sp. showed the highest indole acetic acid (IAA, $16.75 \pm 0.04 \mu\text{g/ml}$) production, gibberellic acid (GA3, $4.12 \pm 0.11 \mu\text{g/ml}$) production, and potassium solubilization index (2.70 ± 0.05). *Bacillus cereus* was the highest phosphate ($174.33 \pm 2.0 \mu\text{g/ml}$) and zinc solubilizer (solubilization index 2.35 ± 0.01 and 2.53 ± 0.02 for ZnO and ZnS respectively). Siderophore activity was the highest in *P. rhodesiae* ($87.37 \pm 0.73\%$). All the isolates mentioned above were active against test plant pathogens *Alternaria sp.*, *Rhizoctonia solani*, *Sclerotinia sclerotiorum*, and *Fusarium solani*. Inoculation of *Bacillus cereus*, *Bacillus flexus*, *Pseudomonas sp.*, and *Pseudomonas rhodesiae* to the soil in pot culture of *Phaseolus vulgaris* showed significant promotion of plant growth and yield.

Published Book Chapters

1. Chetia, P., Dey, D., Puzari, M., Dutta Choudhury, M. 2022. **Bioactive Compounds and Biological Activities of *Dipteris wallichii***. In "Reference Series in Phytochemistry" by Springer Publications. https://doi.org/10.1007/978-3-030-97415-2_15-1.

Research Grants/Projects received

1. **Project title:** "DNA Barcoding of selected plants of Assam used in Ayurveda and traditional medicine, and adulterant detection in marketed Ayurvedic products".

P.I: Dr.Pankaj Chetia,

Co-PI: Dr. Minakshi Puzari

Funding Agency: National Medicinal Plants Board, Govt. of India.

Duration of the project: 3 Years (September 2022 to September 2025).

Amount: Rs. 70,52,475/-

Awards and Recognition

1. Dr. Pankaj Chetia, Associate Professor, Department of Life Sciences was awarded **SERB International Research Experience (SIRE) Fellowship** by SERB, Department of Science and Technology, Govt. of India for a research experience at the University of Adelaide, Australia from 9th August 2022 – 6th November 2022 (03 months).
2. Shyamalima Saikia, a Ph.D. scholar working under the supervision of Dr. Pankaj Chetia, Department of Life Sciences received **2nd best poster award in the two days National Seminar on Integration of Herbal Medicines of NE India in Clinical Practice: Importance, Challenges, and Future**, organized by the Department of Pharmaceutical Sciences, Dibrugarh University during 4-5 November 2022.

***FACULTY OF
HUMANITIES AND LAW***

Research Papers Published in Journals

1. Diengdoh, Basil N. D. **‘A Futile Activity’: Reflections on Imprisonment in India through Kobad Ghandy’s *Fractured Freedom: A Prison Memoir* (2021).** *The Prison Journal*, vol. 102, issue 6, Nov. 2022, <https://doi.org/10.1177/00328855221136202>.

Abstract:

Prison writing in India has not been adequately engaged with, either in its literary bounds or its implications on prison conditions and administration. With the majority of incarcerations consisting of those yet to be found guilty of a crime, the absence of uniform policies or legal provisions concerning these ‘undertrials’ affects in a consequential way the prisoner's ability to exercise certain rights, even if limited, especially with regard to personal expression. This article explores this aspect through the decade-long incarceration reflected upon by Kobad Ghandy's *Fractured Freedom: A Prison Memoir* (2021).

Published Book Chapters

1. Diengdoh, Basil N. Darlong. **‘This Collection is a Start’: An Exploration of Contemporary Women’s Writing in English from Arunachal Pradesh in *The Inheritance of Words: Writings from Arunachal Pradesh*.** *In Reimagining Marginality: Exploitation, Experience, Expression*, edited by Mohan Dharavath and Achuth A., Authorspress, 2022, ISBN 987-93-5529-353-4.

Published Articles

1. Diengdoh, Basil N. Darlong. **A Preliminary Reading of Some Poems from ‘*The Inheritance of Words: Writings from Arunachal Pradesh*’.** *Poetry Without Fear*, vol. 1, no. 2, Aug-Oct, 2022. ISSN 2583-4258. <https://poetrywithoutfear.com/a-preliminary-reading-of-some-poems-from-the-inheritance-of-words-writings-from-arunachal-pradesh-by-dr-basil-n-darlong-diengdoh/>

FACULTY OF SOCIAL SCIENCES

Research Papers Published in Journals

1. Daisy Konwar. **A Travel Cost Estimation of Consumer Surplus in Recreational Visits: A Count Model Approach.** *Assam Economic Journal Volume No.:30.*
2. Debakshi Borah, Amarjyoti Mahanta. **Rural Livelihood Diversification Among Tribal Communities of North-Eastern Region of India : A Systematic Review.** *Journal of Asian and African Studies 2022.*

Abstract:

This article is furnished with a comprehensive review of nature and extent of rural livelihood diversification with special focus on North-Eastern region of India. This study reveals that the tribal communities of this region adopt livelihood diversification as a strategy of coping with risk due to persistent low agricultural productivity and population pressure. Despite this fact, the extent of diversification is low. Agriculture and land still occupies main source of income. It is evident from this article that this region has great potentialities of diversification towards multiple income sources. But difficult terrain and geographical isolation of this region make these resources yet to be properly utilised. The aim of this review article is to point out some issues related to livelihood diversification of North-Eastern region for further research and also try to attract the eyes of policy makers towards the potentialities of livelihood options available in this region.

3. Rantu Hazarika, Amarjyoti Mahanta. **Do the Different Transmission Channels Matter in the Propagation of Monetary Policy in India?.** *Assam Economic Journal, Volume No.:30.*

Abstract:

The effectiveness of monetary policy is evaluated in terms of whether the desired effects of monetary policy on output and price level are achieved. This in turn critically depends upon how well the transmission mechanism functions. Within the transmission mechanism, there are several transmission channels. The purpose of this paper is to assess, by utilizing the popular the SVAR models, the transmission channels of monetary policy using quarterly data from 1998 to 2017. It has been found that changes in interest rates by the RBI have desired effects on output and inflation. Impulse responses also indicate that the policy transmitting variables (exchange rate, asset price and credit) also respond to changes in policy rates. Output effects are found to be short lived compared to the duration of effects on the price level. The overall findings indicate that monetary policy should work in synchronization with other transmission channels as other transmission channels have also the potential of affecting the performance of the economy.

4. Gogoi, M., Buragohain, P. P., & Gogoi, P. **Technical Efficiency of Organic Tea Growers of Assam, India: A study in Dibrugarh District.** *Studies of Applied Economic Volume No.:40(2).*
5. Gogoi, M., Buragohain, P. P., & Gogoi, P. **An Analysis of Economic Issues During First and Second Wave of Covid-19 Pandemic in India: A Literature Survey.** *Journal of Economic Research & Reviews Volume No.: 2(3).*
6. Gogoi, M., Buragohain, P. P., & Gogoi, P. **Farm Level Environmental Efficiency in Summer Paddy Production and its Determinants: A Study of the Brahmaputra Valley in Assam.** *Indian Journal of Economics and Development Volume No.: 18 (4).*
7. Gogoi, M., Buragohain, P. P., & Gogoi, P. **Utilization of Healthcare Services and Associated Factors among Households in Assam, India.** *Online Journal of Health and Allied Sciences Volume No.: 20 (4).*
8. Dolly Phukon. **Preservation of Ethnic Identities and the Politics of Food; analyzing the contributions of the Tai – Ahom women of Assam.** *Indian Journal of Tai Studies, ISSN-0975-5233, Volume: XXII, October 2022.*
9. Dr. Siddhartha Pait. **Revisiting Colonial Adventurism in the Unmapped Assam Frontier Hills and Beyond.** *NAGFANI. Vol. 12, ISSN No.2321-1504, September 2022.*

Conference Papers

1. Buragohain, P. P. **A Study on Wetlands of International Importance: Its Nature, Extent, Threats and Management.** *In a national seminar organized by Nazira College, Nazira on “Human Population, Land Use, Biodiversity and Climate Change” during 12th and 13th August, 2022.*
2. Buragohain, P. P. **Analysis of Technical Efficiency in Mustard Cultivation in Majuli District of Assam.** *In the National seminar organized by Department of Economics, Tripura University during the 23rd Annual Conference of North Eastern Economic Association during 16th to 18th November, 2022.*
3. Alok Ranjan Dutta. **Determinants of adoption of High Yielding Variety of rice and its contribution to farm income: A study in Jorhar district.** *In the National seminar during*

the 23rd Annual Conference of North Eastern Economic Association during 16th to 18th November, 2022.

4. **Dr Rashmi Rekha Bhuyan. Goddess Kamakhya, the Rituals of Sacrifice and Kingship: Reading Sanguinary Chapter of the Kalikapurana** *in 81st session of Indian History Congress held in Madras Christian College, Tambaram, Chennai, Tamil Nadu between 27 & 29 December, 2022.*
5. **Debajanee Bora. Who will listen to us? The unheard voices and narratives of temporary/casual tea garden women workers in Assam.** *Three Days International E-Conference on Gender, Culture and Society 26th, 27th, and 28th November 2022.*

Abstract:

The tea industry of Assam, one of the major organised sectors of economic production in the state, employ the largest numbers of women, however, their voices are mostly unheard. Despite their employment in the paid sector of the economy, there are prominent gender discriminations and gender division of labour which marginalise women workers of tea gardens doubly- firstly as tea garden workers and secondly as women. Moreover, the tea industry, like any other, has many gendered vulnerabilities. Besides, most of the women workers are assigned the job of plucking in the tea gardens which is a physically demanding job that require standing, walking and carrying loads resulting in many occupational health issues among them. The tea garden women workers perform their jobs equally in the paid sector of the economy as the employee of the tea garden and their unpaid jobs at their households, but their participation in the decision-making process at both the sectors i.e., workers' union and within the family, is negligible. Furthermore, the casual or temporary women workers who happens to be the seasonal employees of tea gardens are assigned mostly for tea plucking and do not get the benefits at par with the permanent workers due to their nature of employment. Therefore, it is very

important to analyse livelihoods and employment of the temporary/casual women tea garden workers and examine whether they are further marginalised due to the nature of their employment, its impact on their lives and contextualise the impact of COVID-19 pandemic.

Published Book Chapters

1. Dr Rashmi Rekha Bhuyan. '**Symbolizing the Goddess: A Study on some Saktipithas of Assam**' in *Assam: Land, People and Culture* edited by K. Josh SVD, Nabajit Deka and Anand Sharma, Global Publishing House India, Sanskriti-NEICR (SVD).

Awards and Recognition

1. Mr. Ratul Kumar Lahon, a research scholar at **Department of Economics**, working under the supervision of **Dr Amarjyoti Mahanta** has been awarded PhD by **Dibrugarh University**.

FACULTY OF EDUCATION

Research Papers Published in Journals

1. Shrutidhara Mahanta, Ramesh Chander Sharma. **Challenges, Prospects, and Strategies of Emergency Online Education at Secondary Level in the Assam State of India during COVID-19 Pandemic.** *Education and Self Development. Volume 17, № 4, 2022.*

Abstract:

COVID-19 pandemic has forced educational institutions globally to resort to online mode of teaching and learning. In this paper, we examined how emergency online education was carried out in the Assam state of India. An explanatory mixed methods study methodology was adopted. Perspectives of 92 students and 30 teachers from 30 secondary-level institutions of Assam were examined. Students' acceptability of emergency online education as well as the effects on the mental and physical health of the students were studied. Moreover, the teachers' perspectives on the emerging online threats were also examined. Data were collected using two separate questionnaires administered to the students and the teachers. It was followed with telephonic interviews with the teachers to gain in-depth knowledge on the studied issues. This study examines the positive and negative effects of the adoption of online education. The results indicated that all the students could not avail the benefits of this mode. Social messaging apps and online tools like WhatsApp, schools' own mobile apps, Google Classroom LMS and Google Meet, ZOOM, recorded videos and audio tutorials were used to provide online support to the students. Impact on the physical and mental health of the students was observed. The online teaching process led to the generation of a large repository of e-resources. The results also indicated the ignorance of teachers' regarding the online threats which could severely affect their students. The study recommended awareness programmes and training sessions for teachers and students on educational technology tools, technologies and approaches for the post-COVID-19 period.

Published Book Chapters

1. Shrutidhara Mahanta. **Effect of Online Education system and Work from Home on Female Academics during Covid-19.** *In NariKotha, Editors: DiptyTamuli, Morongi College Publisher:Jonak Printers. Merapani ,Golaghat. Page numbers: 40-52. ISBN: 9788195628964.*