

# CHEMINEWS

N e w s l e t t e r



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## Courses Offered:

- B. Sc. (Hons.) Chemistry
- M. Sc. Chemistry
- Ph. D. Chemistry (Full time)

## ABOUT THE DEPARTMENT OF CHEMISTRY:

The Department of Chemistry started its journey in 2018 and dedicated itself towards the benefit of the society to promote science and nurture the young students. B.Sc. (Hons.), M. Sc. And Ph. D. programs are being offered and the advanced education is carried out by highly qualified faculty members actively engaged in research. Students are exposed to the cutting edge research and technologies and are trained in theory as well as practical classes accordingly. Regular seminars, workshops and webinars are arranged to expose the students to the current advancements in science and related fields. Students take part in summer internship programs in prestigious academic institutions. The M.Sc. students experience advanced research in their M. Sc. Project tenure under the guidance of Departmental faculty members. We also organize campus drive for the recruitment of interested students.

## HIGHLIGHTS OF THE DEPARTMENT:

- UG, PG and Ph.D. programs
- Highly qualified faculty members
- Well-equipped laboratory facility
- Active research and publications in high impact international journals
- International and national seminars and webinars by renowned experts
- Preparatory special classes for NET, GATE, JAM etc.
- Campus drive for students
- Ms. Hamesha Debbarma of B. Sc. Chemistry (Hons.) qualified JAM2021

## AREA OF RESEARCH:

- Bio-inorganic Chemistry and Catalysis
- Coordination Chemistry
- Supramolecular Chemistry
- Surfactant and Surface Activity
- Theoretical Spectroscopy
- Natural Products
- Nano-chemistry and Nanotechnology
- Computational Chemistry
- Biophysical & Colloid Chemistry





## MESSAGE

I am glad to note that the Department of Chemistry is coming up with the second newsletter "CHEMINEWS" volume No 2. The first newsletter of was a grand success and very much appreciated. Chemistry is a subject that has very wide interdisciplinary applications and is of common interest for general people. Ground breaking discoveries in chemistry has direct applications in daily common life and thus it is deeply rooted in the community. In the recent years of COVID-19 outbreak innovations and research did not take a halt but continued to contribute to the society. The education system was also able to adapt itself to online modes whenever necessary during the difficult times. I appreciate the joint efforts of the faculty members, staffs, students and parents alike without whose contribution this would not have been possible so successfully. During these difficult times the Department of Chemistry withheld its quality as can be reflected from the publications, online webinar and seminar conductions, managing online projects for students etc. The students also participated in many extracurricular activities which are highlighted specially to inspire others in such a difficult time during COVID-19 outbreak. In this regard, the newsletter carries a great responsibility to let everyone know its great efforts and achievements so as to inspire the community. This newsletter adds a great value to the department, University as well as to the overall community. I congratulate the Head of the Department and all the faculty members and students for such a great endeavor and wish them success.

Prof. (Dr.) V. N. Rajasekharan Pillai  
Chancellor,  
ICFAI University Tripura





## MESSAGE

It gives me great pleasure to know that the Department of Chemistry (ISS, FST), ICFAI University Tripura is ready to publish the second volume of their newsletter, CHEMINEWS volume 2. Regular publication of this newsletter serves as the ground for appreciation of great achievements by the Department as well as ample encouragements for the students and faculties alike. Online seminars on various advanced topics are being regularly conducted by the Department of Chemistry and are highlighted in the events section of this newsletter. I am happy to note that the Department of Chemistry has successfully conducted online international seminar "ICRTCM 2021". The faculties were able to publish quality works in international journals and were able to keep up the good research work even during the pandemic situation. The students were able to attain great height of achievements and all of these needed to be highlighted in this newsletter which I am sure the editorial members have taken good care at. I am delighted to note that the Department of Chemistry has achieved so much in such a small time since its establishment in 2018. I convey my heartiest greetings to every member of the Department of Chemistry for all these great achievements and wish them the best for their noble endeavor towards great achievements in future as a family of the ICFAI University Tripura.

**PROF. DR. BIPLAB HALDER**  
Vice Chancellor,  
The ICFAI University Tripura





## MESSAGE

It is great to learn that the Department of Chemistry is bringing forward its second volume of CHEMINEWS. It covers the great feats achieved in the span of one year by the members of the family of the Department of Chemistry. The hard work and enthusiasm of each and every member of this department helped to achieve great accomplishment worth recognition. In the disturbing time of the lockdown due to COVID-19 pandemic it was an astonishing all-round effort put together by every member of the department to carry forward academic excellence which are mentioned in this newsletter. I am sure that this newsletter will enlighten the students inspiring them to achieve even higher goals in all aspects of life. I convey my heartiest congratulations to all the members of the Department of Chemistry.

**Dr. A. Ranganathan**  
Registrar,  
ICFAI University Tripura





## MESSAGE

I appreciate the efforts of the members of the Department of Chemistry to come up with the second volume of CHEMINEWS. The achievements of the students and the faculty members are put altogether in this newsletter which contains the year-around achievements worth mentioning in the department. Webinars, technical talks conducted on excellent advanced topics, extracurricular activities performed by the students, academic publications by the faculty members are all put together in this newsletter. The department leads innovative curriculum training the students to stand distinctly for their future careers. The department also successfully conducted campus-drive for the final year M.Sc. Chemistry Students setting an example in the science school. I believe that more industries and companies will be coming for recruitment in the next year. In this regard I am happy to note that the research facility for the Ph.D. students are also being upgraded in a constant effort as new scientific equipment are now being purchased by the ICFAI University for the Chemistry Department. The long list of scientific publications in international journals by the faculty members speaks for itself and I wish the Department of Chemistry to achieve great feats of accomplishment in coming years as an all-round performer in the ICFAI family.

**Dr. Priyanshu Rana Borthakur**  
Dean, FST  
ICFAI University Tripura





## MESSAGE

It is my honor to announce that our Department of Chemistry has come up with its second volume of CHEMINEWS, the annual newsletter that encompasses all the achievements of our faculty members and students for 2021. Since our establishment as a department in 2018, we have come a long way in the academia and it is my pleasure that the Department of Chemistry has been an all-round performer from the very beginning of its great endeavor. Our first newsletter was a great success and was highly appreciated in the ICFAI family which encouraged the whole department to come up with the second volume. All the academic and related achievements have been put together in this newsletter and serves as our annual achievements summary.

Under the favorable teacher-student ratio the Department of Chemistry boasts to run B.Sc. (Hons), M.Sc. as well as PhD programs in parallel. The close mentoring by the faculty members proved to be of great value and helped the students to overcome difficulties during the blended offline-online teaching mode during the pandemic situation. The teaching methodology ensured that no students are left behind in this technology dependent holistic teaching approach. Our methodology blended seamlessly to meet uninterrupted quality teaching throughout the year. I personally thank all the faculty members, students and their parents for providing ample support for the Department of Chemistry to grow and achieve such a great height.

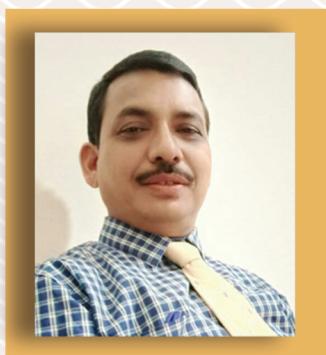
Quality education is of foremost importance to us and our faculty members are in constant effort to modify the syllabus as per need throughout the academic session. Theoretical as well as practical experiments are introduced and modified regularly as per suggestions. Through various national and international seminars and webinars, the students are constantly being exposed to the advanced research topics. We have also conducted international webinar on entrepreneurship and encourage the students to build Atmanirbhar Bharat. We constantly encourage our students for higher studies, research and prepare them for the job market through extra scheduled classes for competitive examinations like NET, GATE, JAM etc. Campus drives have also been initiated with great success in our department and I am happy to announce that six M.Sc students got job offer from TCG Lifesciences Pvt. Ltd. Apart from the regular curriculum the students are taught ethics, soft skills, team work etc. Creative and innovative thinking are always appreciated which helps the student to flourish in academia. In constant encouragements they take part in various workshops, seminars, projects, trainings etc. The students are always encouraged to take part in extracurricular activities and many have achieved great feats. This newsletter offers an attempt to capture the glimpse of our vast academic and academia-related activities in Department of Chemistry nurtured by the ICFAI University Tripura.

I thank the entire team of editorial members for their overwhelming efforts to publish the much awaited second volume of CHEMINEWS.

**Dr. Swarnali Nath Choudhury**  
HOD Chemistry, Associate Professor,  
ICFAI University Tripura



# ICFAI FAMILY



**Dr. Tapan Kumar Mandal**  
Associate Professor  
Department of Chemistry, FST  
ICFAI University Tripura

Dr. Tapan Kumar Mandal has joined as an Associate Professor on 7th March, 2022 in the Department of Chemistry (FST, ISS), ICFAI University Tripura. He had been working since January 02, 2004 in the ICFAI University Dehradun and recently has taken transfer to our department at IUT.

He received M.Sc. in Chemistry from the University of Burdwan, West Bengal and Ph.D. degree in chemistry from the IIT Kharagpur in the year 1999. He did post-doctoral work in the Forschungszentrum, University of Karlsruhe, Germany during the period of 1999-2000 with DAAD Scholarship. Since June, 2001 to December 2003 he worked as CSIR research Associateship in the Materials Science Centre, IIT Khargpur. He also worked as guest Scientist in the Technical University Freiberg, Germany for the period of June-July 2005 and in the Karlsruhe Institute of Nanotechnology, Germany during the period of May-July 2010, with DAAD Scholarship.

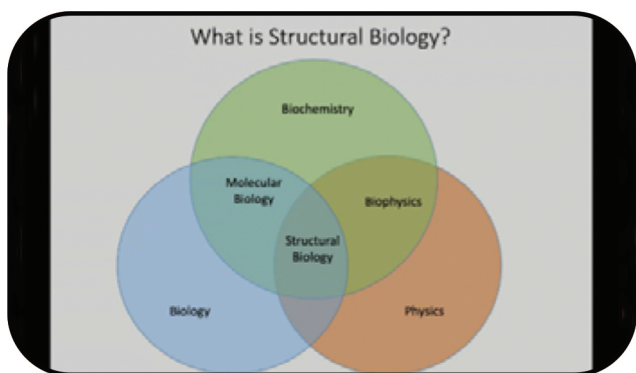
Two of his Ph.D students have received Ph.D degree and four have submitted their Ph.D. thesis. He has 22 years of academic experiences. He has published more than 60 research papers in SCI, Scopus indexed, UGC-CARE and other international journals of repute. He is actively engaged in reputed conferences and seminars, and delivered talks of high value. His research interests include nanomaterials and nanotechnology.



## EVENTS

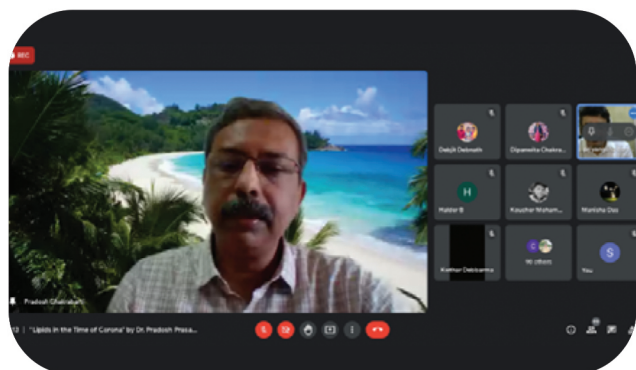
### International Webinar by Dr. Shibom Basu on "Structural Biology – an ever evolving field"

The Department of Chemistry has organized a webinar on "Structural Biology – an ever evolving field" on 5th April, 2021. Dr. Shibom Basu, Scientist, European Molecular Biology Laboratories (EMBL), Grenoble, France, has shared his knowledge on "Structural Biology".



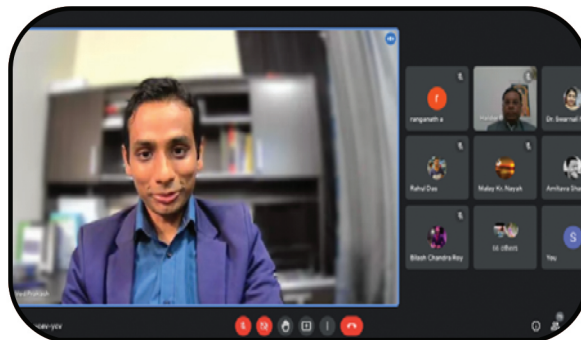
### National Webinar by Dr. Pradosh Prasad Chakrabarti on "Lipids in the Time of Corona"

The Department of Chemistry has organized a regular online webinar for the benefit of the students and faculty members on 9th July, 2021. Dr. Pradosh Prasad Chakrabarti, Senior Principal Scientist at Centre for Lipid Science and Technology, CSIR-Indian Institute of Chemical Technology, Hyderabad has shared his knowledge on "Lipids in the Time of Corona".



### International Webinar by Dr. Ved Prakash on "Exploring Entrepreneurship as a Career"

The Department of Chemistry has organized a webinar on "Entrepreneurship" for the benefit of the students on 24th August, 2021. Dr. Ved Prakash, (Research Scientist, The University of Texas, Dallas, CEO and co-founder of GeniUs Universal) has shared his knowledge on "Exploring Entrepreneurship as a Career".



### International Webinar by Mr. Pritam Sadhukhan on "Harvesting Electronic Pyroelectricity in Polar Molecular Crystals"

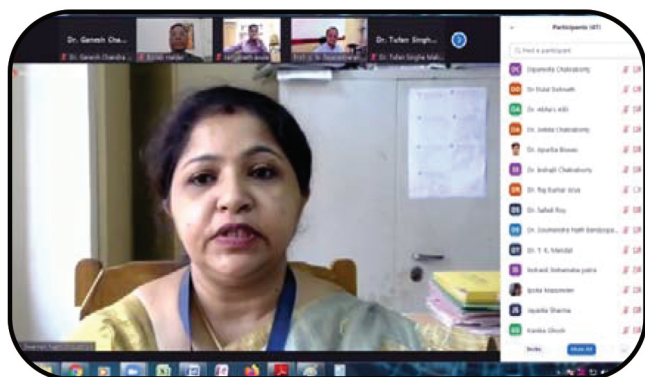
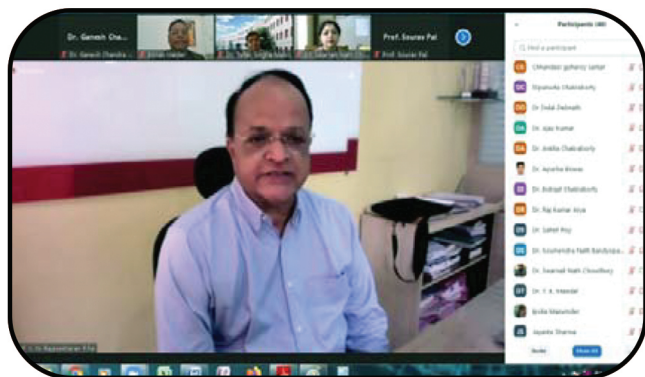
The Department of Chemistry has organized a webinar on 10th September, 2021. Mr. Pritam Sadhukhan, researcher, Kyushu University, Japan has shared his knowledge on "Harvesting Electronic Pyroelectricity in Polar Molecular Crystals". This is an advanced topic of cutting-edge research currently discussed worldwide in the scientific community.



### International Conference on Recent Trends in Chemistry of Materials 2021 (ICRTCM 2021)

The Department of Chemistry has organized a five days (20th September, 2021 – 24th September, 2021) international webinars for the benefit of the students and faculty members. The inaugural plenary lecture was delivered by Prof. Sourav Pal, Director of IISER Kolkata. Prof. Richard Catlow from University College London, has shared his knowledge. Prof. Thomas Wirth, of Cardiff University has explained the advancement in iodine chemistry. Prof. Debashis Ray of IIT Kharagpur, has explained the synthesis and structure of multimetallic coordination aggregates. Prof. Michael D. Ward of University of Warwick, UK, has shared his knowledge. And other renowned international and national scientists have delivered lectures.

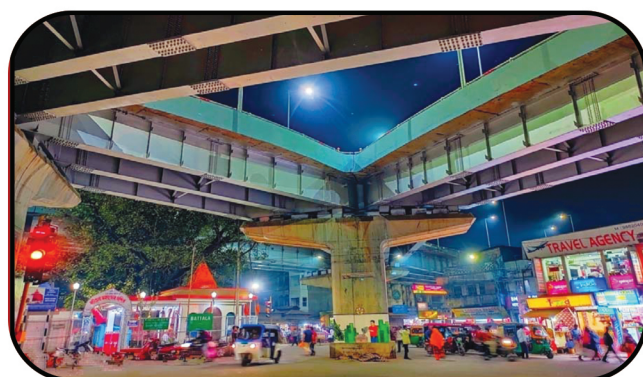




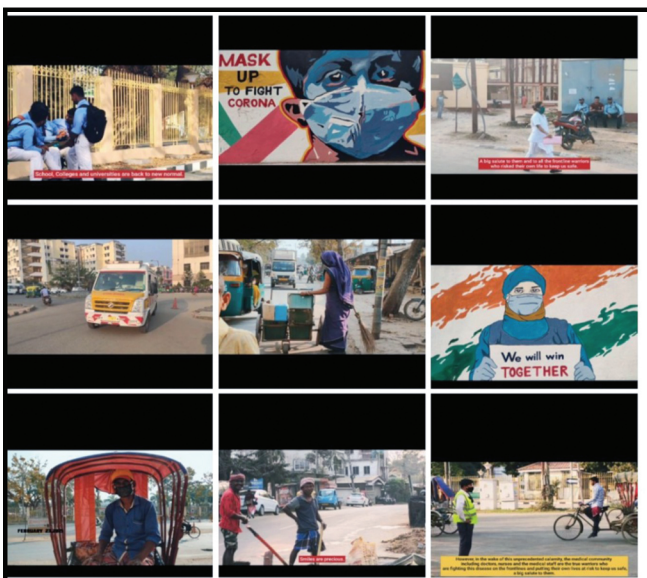
## EXTRACURRICULAR ACTIVITIES

The Department of Chemistry constantly encourages the students to participate in various extracurricular activities necessary for overall development for the students. It helps them to develop personality and promotes teamwork. During the difficult times of the COVID-19 pandemic, it was difficult for the students to participate in such activities, yet a few among them managed to participate.

**Shoumyadeep Paul and AkashShil have participated in a short film competition and secured the 1st position during the ICARIA- 2021**



**Abhijit Debnath, student of B.Sc. Chemistry 2nd Year (1st semester) participated in a photographic competition.**



**Miss Prachi Dhali, student of B.Sc. Chemistry 2nd year, have won the 3rd prize in the interdepartmental essay competition 2021, organized by ICFAI Law School, ICFAI University, Tripura**



## CAMPUS DRIVE FOR RECRUITMENT

The Department of Chemistry successfully conducted campus drive for the M. Sc. Chemistry students who got their final degree. TCG Lifesciences visited our campus for campus-recruitment and a total of eleven M. Sc. Pass-out students (2019-21) appeared for screening test. We are happy to announce that six students got selected after the interview round. The names of the successful candidates are.

- Amlan Bhowmik
- Sumen Sutradhar
- Nandita Bhowmik
- Mampi Debnath
- Udai Bhanu Chandra
- Debajyoti Debnath



Members before the Campus-selection drive.



Selected students with the TCG Lifesciences team members

## SUMMER INTERNSHIP PROGRAM

Summer internship program is mandatorily included in the curriculum for both the B. Sc. And M. Sc. Chemistry course curriculum with a tenure of 45 days. The students are encouraged to join various national level research institutes as well as industries of their respective choices. This not only give them exposure to advanced level of research in international standards, but also trains them for entrepreneurship and promotes team work developing soft skills. The restrictions due to pandemic restricted the students to travel and participate in physically in laboratories, but with the help of great institutions this hurdles could be overcome

as several top notch institutes provided online internship programs of high qualities. IITB offered spoken tutorial on various topics like python, java, virtual lab, JMol, Avogadro, GChempaint etc. Some of our M. Sc. Chemistry students joined CSIR-CERI for their summer project on the topic "Bio-sensor: Design and application", and successfully completed it. Though the students participate in the projects under external guides, they are also assigned an internal member, one of the faculty members from the department for smooth running of the program. During the full program the students are under dual mentorship program for the best outcome. After the successful completion of the project students get their certificates from the concerned institutions and submit a complete project report to the department.

## SPECIAL ACADEMIC ACHIEVEMENT

The Department of Chemistry is happy to announce that the final year B. Sc. Chemistry (Hons.) student Ms. HameshaDebbarma successfully qualified for JAM 2021.



## CREATIVE EXPRESSIONS

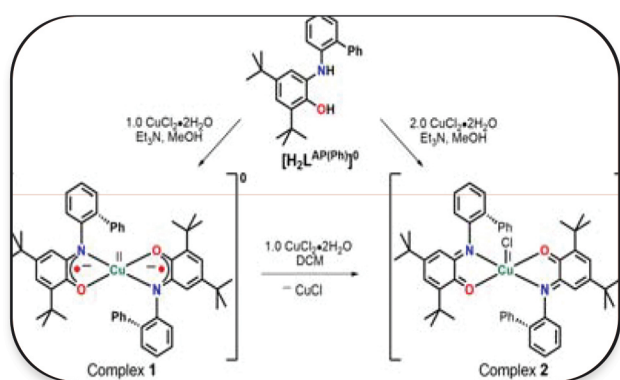
Dr. Ganesh Chandra Paul, Assistant Professor, Department of Chemistry, ICFAI Science School has participated and presented (Oral) in the 57th Annual Convention of Chemists, 2020 & International Conference on Recent Trends in Chemical Sciences (RTCS-2020) organized by the Indian Chemical Society, Kolkata during December 26-29, 2021. The title of the oral presentation is: 'GEOMETRY-DRIVEN IMINOSEMIQUINONE RADICAL TO Cu(II) ELECTRON TRANSFER AND STABILIZATION OF AN ELUSIVE FIVE-COORDINATE Cu(I) COMPLEX'.

### Abstract of the presentation:

The non-innocent ligand [1],[2],[3],[4]H<sub>2</sub>LAP(Ph) contained a bulky phenyl substituent at the ortho-position to the aniline moiety. The ligand reacted with 0.5 equivalent of CuCl<sub>2</sub>•2H<sub>2</sub>O in the presence of Et<sub>3</sub>N under air and provided the corresponding Cu(II)-bis(iminosemiquinone) complex (1). The complex upon oxidation by stoichiometric amount of ferroceniumhexafluorophosphate



(FcPF6) yielded the four-coordinate [Cu(II)-(imono-semiquinone)(iminoquinone)]PF6 complex (3), while the oxidation by an equivalent amount of  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  produced the five-coordinate Cu(I)-bis(iminoquinone)Cl complex (2). Thus, a ligand-based oxidation followed by ligand-to-metal electron-transfer was realized for the latter oxidation process.[5] Removal of the  $\text{Cl}^-$  ion from complex 2 rendered four-coordinate complex 4. The oxidation state of both Cu(I) and iminoquinone moieties remained unaltered upon the change in the coordination number.



All the complexes were characterized by X-ray crystallography. Complexes 2, 3, and 4 were diamagnetic with a  $S = 0$  ground state as evident by EPR and  $^1\text{H-NMR}$  measurements. The UV-Vis-NIR spectra of all the complexes were dominated by charge-transfer transitions. Two oxidations and two reductions waves were noticed in the cyclic voltammogram (CV) of complex 1. [6]Complex 2 and complex 3 underwent one oxidation and three reductions. Unlike complex 3, which experienced ligand-based oxidation, in complex 2 the oxidation was metal-centered [oxidation of Cu(I)-to-Cu(II)].[7]UV-Vis-NIR spectral changes during the fixed-potential coulometric one-electron oxidation and thereafter, EPR analysis consolidated the metal-based oxidation in complex 2. Complex 2 was air stable; however, it oxidized  $\text{KO}_2$  to oxygen molecule and complex 1 was formed in due course as evident by UV-Vis-NIR spectral changes and EPR measurement. [8]TD-DFT calculations have been incorporated to assign the transitions appeared in the UV-Vis-NIR spectra of the complexes.

## References

- [1] W. Kaim and B. Schwederski, *Coord. Chem. Rev.*, 2010, 54, 1580.
- [2] P.J. Chirik, *Inorg. Chem.*, 2011, 50, 9737.
- [3] O.R. Luca and R. H. Crabtree, *Chem. Soc. Rev.*, 2013, 42, 1440.
- [4] J.I. van der Vlugt, *Chem. Eur. J.*, 2019, 25, 2651.
- [5] M. K.Mondal and C. Mukherjee, *Dalton Trans.*, 2016, 45, 13532.
- [6] J. Jacquet, E. Salanouve, M. Orio, H. Vezin, S. Blanchard, E. Derat, M. Desage-El Murr and L. Fensterbank, *Chem. Commun.*, 2014, 50, 10394.
- [7] J. Jacquet, S. Blanchard, E. Derat, M. Desage-El Murr and L. Fensterbank, *Chem. Sci.*, 2016, 7, 2030.
- [8] G. C. Paul, K. Das, S. Maity, S. Begum, H. K. Srivastava, and C. Mukherjee, *Inorg. Chem.*, 2019, 58, 1782.

**Mr. Bilash Chandra Roy** and **Mr. Prasun Bhattacharjee**, Research Scholars, Department of Chemistry, The ICFAI University, Tripura have participated and presented (Oral) in a National Seminar organized in the celebration of the 98th Foundation Day of the Indian Chemical Society, Kolkata on May 09, 2021 (Virtual mode). Mr. Roy presented on the topic entitled "Recent Advances in the Synthesis of Tetranuclear Cu(II) Clusters Containing Cubane and Partial-Dicubane Core with Phenol-Based Schiff-Base Ligands", whereas Mr. Bhattacharjee presented on the topic titled "A Perspective on Pyrazole: Synthetic Strategies and its Biological Applications". Both of them received the "Professor E R Watson Award of Excellence". The supervisors of Mr. Roy and Mr. Bhattacharjee for their presentations were Dr. Tufan Singha Mahapatra, Assistant Professor, Department of Chemistry, ICFAI Science School and Dr. Swarnali Nath Choudhury, HOD and Associate Professor, Department of Chemistry, ICFAI Science School, respectively.

Mr. Bilash Chandra Roy and Mr. Prasun Bhattacharjee, Research Scholars, Department of Chemistry, The ICFAI University, Tripura have also participated and presented (Oral) in the International Seminar on Recent Advances in Chemistry and Material Science (RACMS-2021), Young Scientist Conclave (YSC-2021) and Student Science Meet (SSM-2021) organized by the Indian Chemical Society, Kolkata during August 01-08, 2021 (Virtual mode) in the celebration of the 160th Birth Anniversary of Acharya Prafulla Chandra Ray. The supervisors of Mr. Roy and Mr. Bhattacharjee for their presentations were Dr. Tufan Singha Mahapatra, Assistant Professor, Department of Chemistry, ICFAI Science School and Dr. Swarnali Nath Choudhury, HOD and Associate Professor, Department of Chemistry, ICFAI Science School, respectively.

Mr. Roy presented on the topic entitled "**Recent advances in the synthesis of 3d-4f heterometallic complexes using compartmental ligand approach and their applications**".



### Abstract of the presentation:

In recent decades 3d–4f heterometallic discrete complexes have growing special attraction in the field of molecular magnetic materials with potential applications in the information storage device, quantum computer, spintronics, and magnetocaloric materials. The significant magnetic anisotropy of Ln(III) ions like Tb(III), Dy(III), Ho(III), and Er(III) ions allowed the synthesized complexes as captivating candidates to construct molecular nanomagnets. Compartmental ligands like phenol-based Schiff bases are useful candidates in the construction of 3d–4f heterometallic multinuclear complexes as there are different pockets are available for different types of metals according to the hard and soft acids and bases (HSAB) principle. 4f ions like Tb(III), Dy(III), Ho(III), and Er(III) prefer hard pockets and preferentially interact with the oxygen-rich parts of ligands, while 3d ions like Cu(II), Ni(II), Fe(II) and Mn(III) prefer soft donor atom-like nitrogen atoms for binding. Although the study of 3d–4f heterometallic complexes is a well-established field as many databases related to the structural topology and nanomagnet materials are available in the literature, still, we believe that a lot of effort remains to be carried out

[7] J. Jacquet, S. Blanchard, E. Derat, M. Desage-El Murr and L. Fensterbank, *Chem. Sci.*, 2016, 7, 2030.

[8] G. C. Paul, K. Das, S. Maity, S. Begum, H. K. Srivastava, and C. Mukherjee, *Inorg. Chem.*, 2019, 58, 1782. on the development and understanding of the complicated magnetic exchange interactions between the 3d and 4f spin carriers and subsequent theoretical computational simulation of the observed magnetic behaviours. Here we review the synthetic approaches, structural topology, and magnetic properties of 3d–4f heterometallic discrete complexes.

On the other hand, Mr. Bhattacharjee presented on the topic titled **“A Perspective View on Chemistry and Therapeutic Activity of Pyrazole: Synthetic Strategies and Biological Applications”**.

### Abstract of the presentation:

Pyrazole and its derivatives are considered a pharmacologically important active scaffold that possesses almost all types of pharmacological activities. On the basis of the literature (Ref- B.De, S.Sen, T.S. Easwari, *Asian J. Research Chem.* 5(12): Dec., 2012; Page 1483–1503) it has been revealed that good yield (53–95%) can be achieved by chemo-selective and regioselective synthesis. Pyrazole undergoes electrophilic substitution but nucleophilic substitution is rare one (Ref- B.De, S.Sen, T.S. Easwari, *Asian J. Research Chem.* 5(12): Dec., 2012; Page 1483–1503). The structural modifications of the basic structure of pyrazole, have allowed the preparation of new derivatives with the most important structural variations concerning the substituents on the carbon at the 3-position and at the 5-position of the heterocyclic ring which play a crucial role in biologically active

compounds and therefore representing an interesting template for combinatorial medicinal chemistry (Ref- B.De, S.Sen, T.S. Easwari, *Asian J. Research Chem.* 5(12): Dec., 2012; Page 1483–1503). In this particular presentation the various kinds of synthetic processes for the preparation of pyrazole such as Sonogashira coupling (Ref- Y.Yang, Z.Hu, Yi.Chen, R.Li, Z.Zhan, *Org. Biomol. Chem.*, 2018, 16, 197–201), Michael addition (Ref- V.Sharma, A.Kaur, S.C.Sahoo, S.S.Chimni, *Org. Biomol. Chem.*, 2018, 16, 6470–6478), Cyclocondensation reaction (Ref- B.Willy, T.J.J.Muller, *Eur. J. Org. Chem.* 2008, 4157–4168), Tandem reaction (Ref- B.Willy, T.J.J.Muller, *Eur. J. Org. Chem.* 2008, 4157–4168), Vilsmeier-Haack reaction (Ref- Lokhande, P.Hasanzadeh, K. Konda, S.G. Eur. J. Chem. 2011, 2, 223–228), synthesis of pyrazole by acid-catalyzed imine formation (Ref- L.Knorr, *Dtsch. Ber. Chem. Ges.* 1883, 16, 2597–2599), using 1,3-Diols via Hydrogen Transfer Catalysis, Regioselective synthesis of 1,3- and 1,3,5-substituted pyrazoles using diarylhydrazones and vicinal diols and Ruthenium (II)-catalyzed intramolecular oxidative CN coupling method (Ref- M.J.Naim, O.Alam, F.Nawaj, Md.J.Alam, P.Alam, *J Pharm Bioallied Sci.* 2016 Jan-Mar; 8(1): 2–17) etc will be reviewed. In this particular presentation useful advantages like excellent yields, simple work-up procedures, non-toxic solvent, environmentally friendly and excellent reactivity of this above mentioned processes will be looking through as a whole. The pyrazole nucleuses have medicinal values such as antibacterial, antifungal, antiviral, antitubercular, anticancer activity etc (Ref- K. Karrouchi, S. Radi, Y.Ramli, J. Taoufik, *Molecules* 2018, 23, 134). Some of these compounds have also exhibited anti-inflammatory, antidiabetic and analgesic properties (Ref- K. Karrouchi, S. Radi, Y.Ramli, J. Taoufik, *Molecules* 2018, 23, 134). Many pyrazoles have been found to be luminescent and fluorescent agents (Ref- B.De, S.Sen, T.S. Easwari, *Asian J. Research Chem.* 5(12): Dec., 2012; Page 1483–1503). In the present review our main interest is to emphasize the various synthetic approaches and chemistry reported by researchers on pyrazole for their various pharmacological activities.

**Mr. Bilash Chandra Roy**, Research Scholar, Department of Chemistry, The ICFAI University, Tripura has delivered an oral presentation entitled **“Recent advances in the synthesis of 3d–4f heterometallic complexes using compartmental ligand approach and their applications as molecular magnetic materials”** in the “International Conference on Recent Trends in Chemistry of Materials 2021 (I-CRTCM 2021)”—virtual mode, organized by the Department of Chemistry, ICFAI Science School, The ICFAI University Tripura during September 20–24, 2021. Dr. Tufan Singha Mahapatra, Assistant Professor, Department of Chemistry, ICFAI Science School acted as a supervisor of Mr. Roy for the presentation.



### Abstract of the presentation:

In recent decades 3d–4f heterometallic discrete complexes have growing special attraction in the field of molecular magnetic materials with potential applications in the information storage device, quantum computer, spintronics, and magnetocaloric materials. The significant magnetic anisotropy of Ln(III) ions like Tb(III), Dy(III), Ho(III), and Er(III) ions allowed the synthesized complexes as captivating candidates to construct molecular nanomagnets. Compartmental ligands like phenol-based Schiff bases are useful candidates in the construction of 3d–4f heterometallic multinuclear complexes as there are different pockets are available for different types of metals according to the hard and soft acids and bases (HSAB) principle. 4f ions like Tb(III), Dy(III), Ho(III), and Er(III) prefer hard pockets and preferentially interact with the oxygen-rich parts of ligands, while 3d ions like Cu(II), Ni(II), Fe(II) and Mn(II) prefer soft donor atom-like nitrogen atoms for binding. Although the study of 3d–4f heterometallic complexes is a well-established field as many databases related to the structural topology and nanomagnet materials are available in the literature, still, we believe that a lot of effort remains to be carried out on the development and understanding of the complicated magnetic exchange interactions between the 3d and 4f spin carriers and subsequent theoretical computational simulation of the observed magnetic behaviours. Here we review the synthetic approaches, structural topology, and magnetic properties of 3d–4f heterometallic discrete complexes.

### References:

1. Liu, K.; Shi, W.; Cheng, P. Toward Heterometallic Single-Molecule Magnets: Synthetic Strategy, Structures and Properties of 3d–4f Discrete Complexes. *Coord. Chem. Rev.* 2015, 289–290 (1), 74–122. <https://doi.org/10.1016/j.ccr.2014.10.004>.
2. Bencini, A.; Benelli, C.; Caneschi, A.; Carlin, R. L.; Dei, A.; Gatteschi, D. Crystal and Molecular Structure of and Magnetic Coupling in Two Complexes Containing Gadolinium(III) and Copper(II) Ions. *J. Am. Chem. Soc.* 1985, 107 (26), 8128–8136. <https://doi.org/10.1021/ja00312a054>.
3. Goura, J.; Guillaume, R.; Rivière, E.; Chandrasekhar, V. Hexanuclear, Heterometallic, Ni<sub>3</sub>Ln<sub>3</sub> Complexes Possessing O-Capped Homo- and Heterometallic Structural Subunits: SMM Behavior of the Dysprosium Analogue. *Inorg. Chem.* 2014, 53 (15), 7815–7823. <https://doi.org/10.1021/ic403090z>.
4. Jiang, L.; Liu, B.; Zhao, H. W.; Tian, J. L.; Liu, X.; Yan, S. P. Compartmental Ligand Approach for Constructing 3d–4f Heterometallic [CuII<sub>5</sub>LnIII<sub>2</sub>] Clusters: Synthesis and Magnetostructural Properties. *CrystEngComm* 2017, 19 (13), 1816–1830. <https://doi.org/10.1039/c6ce02519f>.

5. Jurca, T.; Farghal, A.; Lin, P. H.; Korobkov, I.; Murugesu, M.; Richeson, D. S. Single-Molecule Magnet Behavior with a Single Metal Center Enhanced through Peripheral Ligand Modifications. *J. Am. Chem. Soc.* 2011, 133 (40), 15814–15817. <https://doi.org/10.1021/ja204562m>.

## SCIENTIFIC PUBLICATIONS

All the faculty members from Chemistry Department are devoted to Research related activities and during this course of time (October 2020– October 2021), the pervisor of Mr. Roy for the presentation. faculty members published total six (6) research articles in reputed international journals and also published one Patent.

**Dr. Ganesh Chandra Paul**, Assistant Professor, Department of Chemistry, ICFAI Science School has published one international research article in SCI and Nature Indexed journal during the academic year 2021. The research article published in 'Dalton Transactions' journal resulted from a fruitful collaboration among Dr. Paul and the researcher of Prof. (Dr.) Chandan Mukherjee group in Indian Institute of Technology Guwahati during the course.

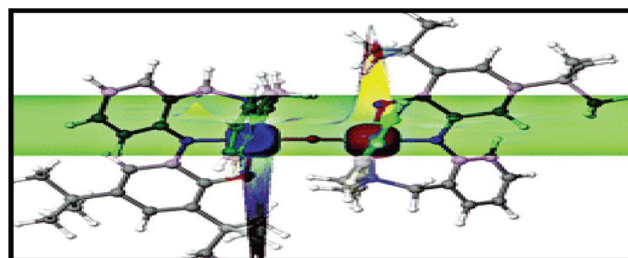
### The publication details are the following:

Paul, G. C.; Sarkar, P.; Sarmah, Amrit.; Shaw, P.; Maity, S. and Mukherjee, C. A Combined Experimental and Theoretical Study on a Single, Unsupported Oxo-Bridged Mn(III, III) Dimer Coordinated to Two Iminobenzosemiquinone<sup>•-</sup> Radical Anions. *Dalton Trans.* 2021, 50, 8768–8775. DOI: <https://doi.org/10.1039/D1DT00489A>.

Publisher: Royal Society of Chemistry,  
Impact factor: 4.390

### Summary:

An unprecedented two iminosemiquinone radical-coordinated ( $\mu$ -oxo)-bridged dinuclear, high-spin Mn(III, III) complex (1) was reported. Metal-centric oxidations and ligand-based reductions are confirmed by spectroscopic and DFT-based calculations.



**Dr. Tufan Singha Mahapatra**, Assistant Professor, Department of Chemistry, ICFAI Science School has published one international research article in ACS Applied Materials & Interfaces journal (SCI) and one Indian Patent during October 2020–October 2021. The published research article resulted in fruitful collaboration with CSIR-Central Salt and Marine Chemicals Research Institute, and CSIR-Central Electrochemical Research Institute (CECRI).



The publication and Patent details are the following:

**Publication details:**

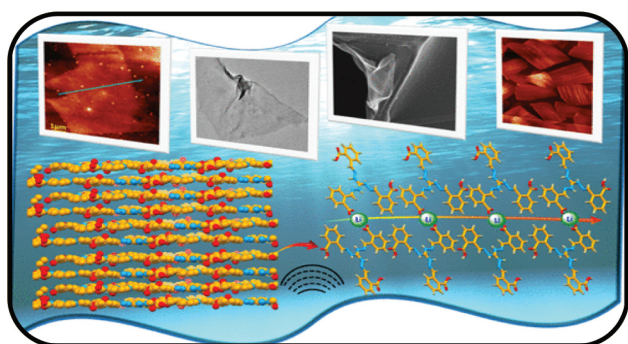
Dey, A.; Ramlal, V. R.; Sankar, S. S.; SinghaMahapatra, T.; Suresh, E.; Kundu, S.; Mandal, A. K.; Das, A. Crystalline Free-Standing Two-Dimensional Zwitterionic Organic Nanosheets for Efficient Conduction of Lithium Ions. *ACS Applied Materials & Interfaces* 2020,12 (52), 58122-58131, DOI: 10.1021/acsami.0c17683.

Publisher: American Chemical Society, Impact factor:9.229

**Summary:**

A unique lithium-ion conducting behavior of zwitterionic 2D-ONs, formed through self-assembly of a small organic molecule AM-1 has been reported. Different microscopic studies confirm the near-atomic thickness (3.5 nm) of these 2D-ONs. Results of the single-crystal X-ray diffraction studies confirm the presence of a one-dimensional (1D) channel in crystalline 2D-ONs, which was generated during the self-assembly process of the zwitterionic monomer scaffold. The presence of immobilized ionic centers with well-defined directional channels in the 2D-ONs favors the transportation of lithium ions with a room-temperature lithium-ion conductivity of  $5.14 \times 10^{-5} \text{ S cm}^{-1}$ , which is rather unique for self-assembled 2D-ONs.

**Graphical Abstract:**



**Patent Details:**

Indian Patent Application No.: 201911036793;Publication Date:19/03/2021.

Title:A novel terbium-based coordination polymer for the detection of FOX-7 and process for preparation thereof.

Inventors: TufanSinghaMahapatra, Harwinder Singh, Ananta Dey, and Amitava Das

Abstract:2,2-Dinitroethene-1,1-diamine (FOX-7) is an insensitive high explosive material that may threaten national and global securitythrough terrorist activities. FOX-7 has lower sensitivity and comparable performance to RDX. So, the detection of FOX-7 is an urgentissue. The present invention relates to the novel compound of Formula I for the detection of the FOX-7. More particularly, the presentinvention relates to the process for the fluorescence detection of the FOX-7.

The present invention further relates to a kit comprising a compound of Formula I.

**Dr. Subhadip Roy**, Assistant Professor, Department of Chemistry, ICFAI Science School has co-authored two research articles in SCI category in two renowned international journals named 'InorganicaChimicaActa' and 'Polyhedron', respectively during November 2020-October 2021. In the research article published in 'InorganicaChimicaActa', along with Dr. Roy, researchers from Tripura University, Gourban-ga University (West Bengal), University of Lisboa (Portugal), University of Balearic Island (Spain) and Nanyang Technological University (Singapore) were also involved. On the other hand, the research article published in 'Polyhedron' resulted from a fruitful collaboration among Dr. Roy and researchers from St. Xavier's College Kolkata and Jadavpur University.

The publication details are the following:

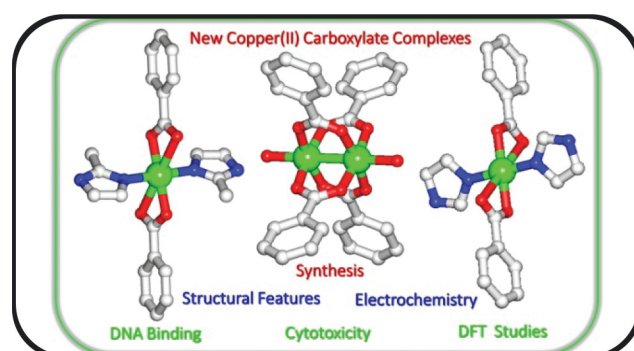
1. Bhattacharjee, M.; Boruah, S. R.; Dutta Purkayastha, R. N.; Ganguly, R.; Maiti, D.; Franconetti, A.; Frontera, A.; Kirillov, A. M.; Chowdhury, S.; Roy, S.; Nath, P. Synthesis, characterization, DNA binding ability, in vitro cytotoxicity, electrochemical properties and theoretical

studies of copper(II) carboxylate complexes. *Inorg. Chim. Acta*2021,518, 120235 DOI: <https://doi.org/10.1016/j.inca.2020.120235>.

Publisher:Elsevier, Impact factor:2.545

**Summary:**

Four copper(II) carboxylate complexes, namely  $[\text{Cu}_2(\mu\text{-}3,5\text{-dinitrobenzoate-O,O'})_4(4\text{-}(\text{dimethylamino})\text{benzaldehyde})_2]$  (1),  $[\text{Cu}_2(\mu\text{-benzoate-O,O'})_4(\text{benzoic acid})_2]$  (2),  $[\text{Cu}_2(\mu\text{-benzoate-O,O'})_4(\text{H}_2\text{O})_2]$  (3) and  $[\text{Cu}(\text{benzoate-O,O'})_2(\text{imz})_2] \cdot 2\text{H}_2\text{O}$  (4) (imz = imidazole, 2-Me-imz = 2-methyl-imidazole), were synthesized and comprehensively characterized by elemental analysis, spectroscopic methods, single crystal X-ray diffraction, cyclic voltammetry (CV), topological analysis as well as theoretical studies. The interaction of 1–4 with calf thymus DNA was investigated by UV–visible and fluorescence spectroscopy, revealing a moderately strong non-intercalative mode of interaction. In vitro cytotoxicity study of the complexes on HepG2 (human liver hepatocellular carcinoma) cell lines revealed a significant inhibition activity.



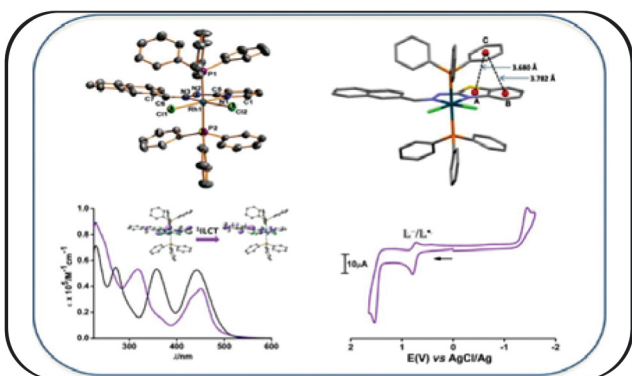


The details of the second publication by Dr. S. Roy is:  
 2. Dinda, S.; Naskar, S.; Roy, S.; Pramanik, K.; Ganguly, S. An insight into the coordination specificity of polyaromatic hydrocarbons (PAHs) grafted hydrazones towards rhodium(III). *Polyhedron* 2021,205, 115318 DOI: <https://doi.org/10.1016/j.poly.2021.115318>  
 Publisher:Elsevier, Impact factor:3.052

### Summary:

Upon treatment of the polyaromatic hydrocarbon (PAH) grafted hydrazones HL (1) with  $[\text{RhCl}(\text{PPh}_3)_3]$ , complexes of type  $[\text{Rh}(\text{L})\text{Cl}_2(\text{PPh}_3)_2]$  (2) have been isolated. The X-ray diffraction technique has been used to elucidate the structures of three complexes. The rich spectral features of the complexes in the UV-vis region have been explained by TD-DFT and their redox active nature has been validated from the well-defined responses at mild potentials as well as from a theoretical investigation of the redox orbitals.

### Graphical Abstract:

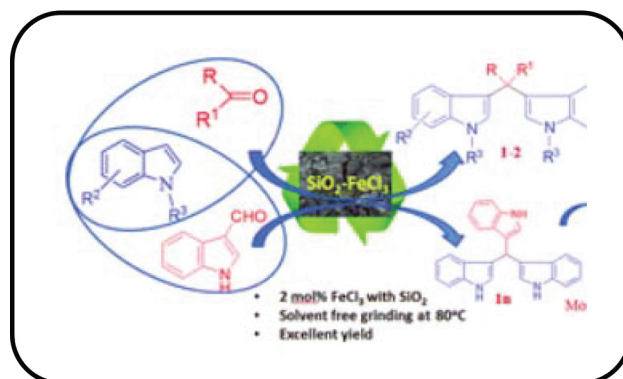


Dr. Ankita Chakraborty, Assistant Professor, Department of Chemistry, ICFAI Science School has published the given international research article in SCI Indexed journal during the academic year 2021

The publication details are as follows: -

Deb, B.; Debnath, S.; Chakraborty, A and Majumdar, S. Bis-indolylolation of aldehydes and ketones using silica-supported  $\text{FeCl}_3$ : molecular docking studies of bisindoles by targeting SARS-CoV-2 main protease binding sites. *RSC Adv.*, 2021, 11, 30827-30839, DOI: 10.1039/d1ra05679d  
 Publisher: Royal Society of Chemistry, Impact factor: 3.36

An operationally simple, efficient and versatile procedure for the synthesis of bis-indolylmethanes via the reaction of indoles with aldehydes or ketones in the presence of silica-supported ferric chloride under grindstone conditions was reported. Molecular docking studies targeted toward the binding site of SARS-CoV-2 main protease (3CLpro or Mpro) enzymes were reported with the synthesized bis-indoles.



**Dr. Subhadip Roy**, Assistant Professor, Department of Chemistry, ICFAI Science School has published one international research articles in SCI journals on November 2020.

The publication details are the following:

Mondal, S.; Ghosh, S. Spectroscopic study on the interaction of curcumin with single chain and gemini surfactants. *Chem. Phys. Lett.*, 2021, 762, 138144

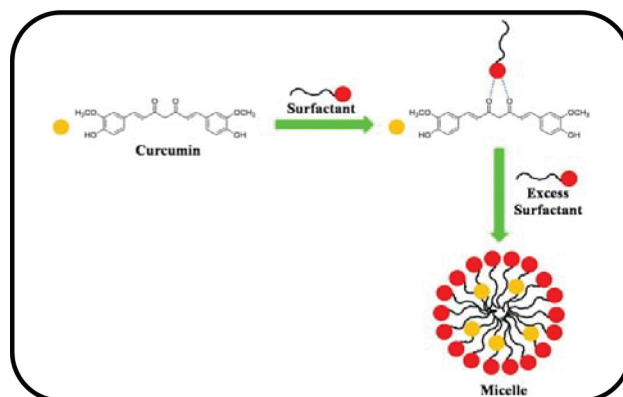
DOI:<https://doi.org/10.1016/j.cplett.2020.138144>

**Publisher: Elsevier, Impact factor: 2.328**

### Summary:

Curcumin is a natural antioxidant and a polyphenol. The interaction of curcumin with different types of surfactants, (e.g., cationic gemini, anionic, nonionic and bile salt) in an aqueous medium has been studied spectrophotometrically and fluorimetrically in pre-micellar and post-micellar concentration regions. Initially, curcumin forms complex with surfactant molecules and then it is incorporated into the hydrophobic core of the micelle.

### Graphical Abstract:



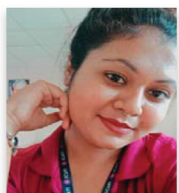


## STUDENTS' SPEAK



"My experience as a PG student at the ICFAI University over the last one year has been really great. Our faculty members are so cooperative. One thing I must say about them that they always motivate us to do our work properly and even sometimes push us a bit harder to become a better version of ourselves. I am very much thankful to all of them".

Sourav Ghosh  
M. Sc. Chemistry 2 nd Year



"University should be a place of light liberty and of learning", same goes the proverb for our ICFAI University Tripura. Our university brings about development of all our abilities including rectifying our stupidity and helps us to re correct our own faults and thus socializes us to fit in our modern society. Moreover, the professor of our university inspires us to keep faith in ourselves and motivates US to keep on moving and climbing through the hard to hardest ladder of our life until we reach the ultimate goal of our life. Heartiest thanks to our professors for their hard work and benign helpful nature."

Kaushiki saha  
B. Sc. Chemistry 3rdyear



"The thing which I as a student like the most is the cooperative environment of the faculty members as well as the surrounding. Everyone is doing their own matter. Anti-ragging environment which is most impressive. For this ICFAI University is the prime choice".

Gourab Das  
B. Sc. Chemistry 3rd Year



"Hi! I am ArpitaDebnath, B. Sc 3rd year, Chemistry Hons. Being a student of chemistry of ICFAI UNIVERSITY, Tripura I love the way of studying by our faculty members and most importantly our Lab Instructor and their instructions about Lab Classes is amazing. So I feel it is a great place to study and explore my knowledge, which will help me a lot to build my successful future. Thanks".

Arpita Debnath  
B. Sc. Chemistry 3rdyear



"It's not about perfect. It's about effort; Yes! This one of the dominant feature of our ICFAI UNIVERSITY. We are provided with regular classes, Labs, Lectures, Curricular activities and opportunity to clear out our confusions regarding studies. ICFAI has given me the confidence that I used to fail. The facilities are highly interactive and always available for our proper a doubt clearing queries.

Thanks again to my University for the valuable efforts and to provide us a positive learning environment".

Dipanwita Chakraborty  
B. Sc. Chemistry 3rd Year



## STUDENTS' SPEAK

"I feel great indulgence in expressing my deepest sense of gratefulness to my respected faculties of Chemistry department, ICFAI University Tripura for their consistent guidance, motivation & encouragement throughout my entire 2 years' journey in B. Sc. chemistry (hons) & counting.

In this 2 years journey my best part is in the lab. It's a highly equipped lab with more highly experienced faculties, they are friendly with the students, they try to reach to the point what a student is in need off.

I forgot to mention in this 2 years span we faced covid-19 but nothing could stop them, they made alternative ways through online class, since this technology was new for all of us, sometimes we guided them and sometimes they guided us, we all together faced this challenging situation & overcame through it.

Lastly I like to add "they know how to make better chemists".

Don't miss 'novatos' & 'icaria' northeast's one of the best cultural nights which is being organized by our university "ic-faiuniversity tripura" every year".

Bikram Saha  
B. Sc. Chemistry 3rd Year



"we collected lots of memories from our university. Our faculty members are cooperative, they always help us officially and unofficially. Our labs facility is excellent. They make us confident and fearless so that we are not afraid to work in the future".

- Rima Das  
B. Sc. Chemistry 3rdYear



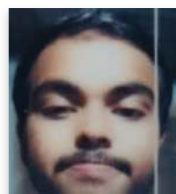
"The Institute of Chartered Financial Analyst of India" (ICFAI) University gives good education and guidance. All faculty are too good and honest in their job. They were highly qualified and has experience of several years. They were very interactive and supportive of us; we can freely ask them our doubts without any hesitation. The infrastructure of our University is very good and the campus is huge. Well facilitated with a big laboratory, library, games facilities and much more...I am thankful be a part of ICFAI University Tripura, Thank you".

Diptanil Chakraborty  
B. Sc. Chemistry 3rd Year



"Hello my self SonamBhowmik and I am currently pursuing a BSC Chemistry at ICFAI UNIVERSITY TRIPURA. All the teachers of Department of Chemistry have ability to bring conceptual clarity and thinking, ability to provide motivation and have good community skills. Our Chemistry lab room are very nice and well manner and the lab instructors are always ready to help us and I am proudly to say that I am the student of this University".

- Sonam Bhowmik  
B. Sc. Chemistry 2nd Year



"Hello my name is Jayanta Sharma and I am currently pursuing a BSC Chemistry at ICFAI UNIVERSITY TRIPURA. All the teachers of Department of Chemistry have ability to bring conceptual clarity, perfect precision and thinking, ability to provide motivation and have good community skills. Our Chemistry lab room are very nice and well-mannered and the lab instructors are always ready to help us and so I am proudly to say that I am the student of this University".

- Jayanta Sharma  
B. Sc. Chemistry