SRI VINAYAGA COLLEGE OF ARTS AND SCIENCE

(Affiliated to Annamalai University, Chidambaram)

ULUNDURPET- 606 107, TAMILNADU, INDIA

INTERNATIONAL CONFERENCE

ON

EMERGING TRENDS IN APPLIED SCIENCES (ETAS – 26)

27th February 2026

SOVENIR

Organized

by

Departments of Biotechnology, Chemistry & Physics

Dr. V. GANESAN
Seceratary
Sri Vinayaga College of Arts & Science
Ulundurpet – 606 107, Kallakurichi (dt)
Tamil Nadu, INDIA

Message from the Chief Patron

It gives me immense pleasure to extend my warm greetings and best wishes to all the delegates, academicians, researchers, scientists, and students participating in the **International Conference on Emerging Trends in Applied Sciences (ETAS – 26)**, scheduled to be held on 27th February 2026. I am delighted that the Departments of Biotechnology, Chemistry, and Physics of Sri Vinayaga College of Arts & Science have taken this commendable initiative to organize an international platform that brings together experts from diverse disciplines of applied sciences. Such interdisciplinary conferences are vital in fostering innovation, encouraging collaborative research, and translating scientific knowledge into practical solutions for societal and industrial challenges.

I sincerely appreciate the organizing committee for their dedication and meticulous efforts in making this conference a reality. I am confident that the deliberations, keynote lectures, and technical sessions will be intellectually stimulating and academically enriching for all participants.

I wish the conference every success and hope that **ETAS – 26** will lead to meaningful discussions, fruitful collaborations, and lasting contributions to the advancement of applied sciences.

With best wishes,

Dr. R. KUMARESAN
Principal
Sri Vinayaga College of Arts & Science
Ulundurpet – 606 107, Kallakurichi (dt)
Tamil Nadu, INDIA

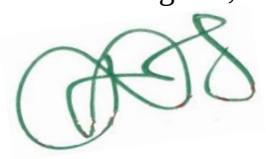
Message from the Patron

It is with great pleasure and pride that I extend my warm greetings and hearty welcome to all the distinguished delegates, eminent academicians, researchers, scientists, industry experts, and students participating in the **International Conference on Emerging Trends in Applied Sciences (ETAS – 26)**, held on 27th February 2026. I am delighted that the Departments of Biotechnology, Chemistry, and Physics of Sri Vinayaga College of Arts & Science have jointly organized this prestigious international conference, providing a vibrant platform for intellectual exchange and interdisciplinary collaboration. Such academic initiatives play a crucial role in strengthening research culture and promoting innovation in higher education institutions. The rapid advancements in applied sciences have significantly influenced modern society by offering sustainable solutions to real-world problems in healthcare, agriculture, energy, environment, and technology. ETAS – 26 aims to highlight these emerging trends while encouraging young researchers to pursue excellence, creativity, and ethical scientific practices.

I commend the organizing committee, faculty members, and student volunteers for their dedicated efforts and teamwork in successfully planning this conference. I am confident that the keynote addresses, technical sessions, and interactive discussions will be both insightful and inspiring, leading to meaningful collaborations and future research endeavors.

I wish all the participants a rewarding and enriching conference experience and extend my best wishes for the grand success of ETAS – 26.

With best regards,



Dr. A. SABARIDASAN
Head & Assistant Professor
PG & Research Department of Biotechnology
Sri Vinayaga College of Arts & Science
Ulundurpet – 606 107, Kallakurichi (dt)
Tamil Nadu, INDIA

Message from the Convenor

It is my great privilege and honor to extend a warm welcome to all the distinguished delegates, eminent academicians, researchers, scientists, industry professionals, and students to the ***International Conference on Emerging Trends in Applied Sciences (ETAS – 26)***, held on 27th February 2026. The Departments of Biotechnology, Chemistry, and Physics of Sri Vinayaga College of Arts & Science have jointly organized this international conference with the objective of providing a dynamic platform for sharing innovative research findings, exchanging interdisciplinary ideas, and discussing recent advances in applied sciences. ETAS – 26 aims to bridge the gap between fundamental research and real-world applications, fostering collaborations among researchers from academia, research institutions, and industry. In the present era of rapid scientific and technological development, applied sciences play a crucial role in addressing global challenges related to sustainability, healthcare, energy, environment, and industrial development. This conference brings together experts from diverse fields to deliberate on emerging trends, novel methodologies, and future directions that will shape the scientific landscape.

I sincerely thank our Chief Patron, Patron, invited speakers, advisory committee members, reviewers, sponsors, and all the organizing committee members for their invaluable support and tireless efforts in making this conference a success. I also appreciate the enthusiastic participation of delegates, whose contributions add immense value to the academic deliberations.

I am confident that the technical sessions, keynote lectures, and interactive discussions will be intellectually stimulating and professionally enriching for all participants. I hope that this conference will inspire fruitful collaborations and enduring academic partnerships.

With warm regards,

Dr. P. SATHISHKUMAR, M.Sc., Ph.D.,
Assistant Professor (Senior Grade)
Department of Chemistry
Vellore Institute of Technology (VIT)
Vellore – 632 014, Tamil Nadu, INDIA

Message from the Chief Guest

It is a great honor and privilege to be associated with the International Conference on Emerging Trends in Applied Sciences (ETAS – 26), held on 27th February 2026. I extend my warm greetings to all the distinguished delegates, academicians, researchers, scientists, industry professionals, and students participating in this prestigious academic event. I sincerely appreciate the efforts of the Departments of Biotechnology, Chemistry, and Physics of Sri Vinayaga College of Arts & Science for organizing this international conference, which provides an excellent platform for the exchange of ideas, dissemination of cutting-edge research, and promotion of interdisciplinary collaboration. Conferences such as ETAS – 26 play a crucial role in fostering scientific curiosity, innovation, and the practical application of research outcomes.

The field of applied sciences is at the forefront of addressing contemporary challenges related to healthcare, environment, energy, sustainability, and technological advancement. This conference brings together experts from diverse disciplines, enabling meaningful discussions on emerging trends, novel technologies, and future research directions that have the potential to create a lasting impact on society.

I am confident that the keynote sessions, technical presentations, and interactive discussions will be intellectually stimulating and academically enriching for all participants. I encourage young researchers and students to actively engage in these deliberations, as such platforms are invaluable for learning, networking, and professional growth.

I congratulate the organizing committee for their dedication and meticulous planning, and I wish the International Conference on Emerging Trends in Applied Sciences (ETAS – 26) a grand success. May the deliberations of this conference inspire innovation, collaboration, and excellence in applied sciences.

With best wishes

CONTENT

ASSESSMENT OF ANTIOXIDANT ACTIVITY AND INHIBITORY EFFECTS ON LIPID PEROXIDATION OD ORGANIC EXTRAS OF CALYCOPTREIS *FLORIBUNDA* (LINN) IN HIGH FAT INDUCED OXIDATIVE STRESS IN RATS

D. KAVIYA NANDHINI & Dr. S. BHUVANESWARI SANTHARAM

Department of Biochemistry, K.R.College of Arts and Science, Kovilpatti, Tamilnadu, India.

The aim of this study was to investigate effect of various extract of *Calycopteris floribunda* on the lipid peroxidation and invivo antioxidant systems in tissue (Liver, Heart and Aorta) of high fat fed rats High fat diet rats showed significantly (P<0.001) reduced the levels of tissue enzymatic antioxidant and non enzymatic antioxidant (Glutathione). The level of Thiobarbituric reactive substances (TBARS) are elevated in HFD rats (group II) When compared with control rats (Group 1) After administration of ethyl acetate extract of *Calycopteris floribunda* in high fat diet rats showed significantly (P 0.001) increased the levels of antioxidant enzymes (CAT, SOD, GPS, GR) and non enzymatic antioxidant glutathione (GSH, CAT, SOD, GPx, GR) and lowered the concentration of TBARS when compared with other two extracts The ethyl acetate extract of Calycopteris floribunda in high fat diet rats were found reduced the concentration of TBARS (a measure of lipid peroxidation) than that of HFD cats (Group II). In conclusion, ethyl acetate extract of *Calycopteris floribunda* could be an option to enhance the supply of antioxidants and to safeguard against oxidative stress and thereby preventing the formation of atherosclerotic plaques.

Keywords: *Calycopters floribunda*, Antioxidant, High Fat diet, Rats, Lipid peroxidation.

REGULATION OF ESTROUS CYCLE BY *AZADIRACHTA INDICA* FLOWER EXTRACT IN LETROZOLE INDUCED POLYCYSTIC OVARIAN SYNDROME IN WISTARS ALBINO RATS

SHOBANA C

Department of Biochemistry, School of Life Sciences, Vels Institute of Science, Technology and Advanced Studies, Chennai, Tamil Nadu, India.

Email: shobana.sls@vistas.ac.in

The menstrual cycle is regulated by luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the anterior pituitary, under the control of gonadotropin-releasing

hormone (GnRH) from the hypothalamus. Any disruption to this regulatory mechanism modifies the pulsatile secretion of these hormones, particularly luteinizing hormone (LH), resulting in polycystic ovarian syndrome (PCOS). Alterations in vaginal cytology are employed to interpret fluctuations in hormonal levels and modifications within the estrous cycle. The objective of this investigation is to compare the patterns of vaginal cytology and body mass in PCOS rats treated with metformin and *Azadirachta indica* flower extract. Twenty-four Wistar rodents were selected and allocated into four groups: control, induced, treatment, and referral. Polycystic ovary syndrome (PCOS) was induced in all groups, excluding the control group, by administering letrozole via oral gavage for duration of 21 days. Following the induction of PCOS, the referral and treatment groups received respective treatments for PCOS with metformin and Azadirachta indica flower extract over the subsequent 21 days. Vaginal smears were collected daily from all groups starting from day one and examined to determine the estrous cycle. The bodily mass of the animals was recorded on days 1, 21, and 42. Animals were sacrificed 24 hours following the final dose, and the reproductive organs were subsequently dissected and weighed. The study results indicate that the estrous cycle begins to revert after one week of *Azadirachta indica* flower extract administration, although the alterations occurred more gradually in the referral group. There was a swift reduction in body mass and reproductive organs within the treatment and referral groups compared to the induced and control groups. The findings of this study indicate that *Azadirachta indica* flower extract exhibits greater efficacy in treating PCOS compared to metformin.

Keywords: Gonadotropin-releasing hormone, *Azadirachta indica* flower extract, Letrozole, Estrous cycle, Vaginal smear

ZIZIPHUS JUJUBA MEDIATED SYNTHESIS OF COPPER OXIDE NANOPARTICLES: CHARACTERISATION AND ANTIBACTERIAL PERFORMANCE

Dr. R. KIRUBHA

Assistant professor, Department of chemistry, Sarah Tucker College (Autonomous), Tirunelveli.

Email id: blessedkiruba@gmail.com

The synthesis of metal oxide nanoparticles with the use of medicinal plant extract is a promising alternative to the conventional chemical method. This study aims at to synthesize

theiron oxide nanoparticles using a novel approach of green synthesis from a species of flowering plant, *Ziziphus jujuba* fruit extract which is amultifarious beneficial medicinal plant.Recently, iron oxide nanoparticles (NPs) have attracted much consideration due to their unique properties. In this thesis, nano scaled iron oxide particles were synthesized from hexahydrate ferric chloride ($FeCl_3.6H_2O$) as precursor with the addition of *Ziziphus jujube fruit* powder extract as reducing agent as well as stabilizing agent under the atmospheric conditions. The biosynthesized iron oxide nanoparticle was confirmed by the systematic characterization using UV-Vis spectroscopy, FT-IR, XRD and SEMstudies. Furthermore, this study also evaluated the antibacterial activity of the synthesized Iron oxide nanoparticles.

Keywords: *Ziziphus jujube fruit*, ferric chloride and Nanoparticle synthesis.

PHOTOCATALYTIC ACTIVITIES OF SILVER NANOPARTICLES USING PLANT EXTRACT

T. ANANTHA KUMAR[1*], N. VANITHA[1] & P. PARVATHIRAJ[2]

[1]Department of Chemistry & Physics, Merit Arts and Science College (affiliated to Manonmaniam Sundaranar University), Idaikal, Ambasamudram, Tirunelveli, Tamil Nadu, India.

[2]PG& Research Department of Zoology, Yadava College, Thiruppalai, Madurai-625 014, Tamilnadu, India.

Green nanotechnology has emerged as a viable option for the production of nanoparticles. The purpose of the current investigation was to synthesize silver nanoparticles (AgNPs) using Spermacoceocymoidesextracts. We report the green synthesis of silver nanoparticles using the aqueous leaf extract of Spermacoceocymoides, which acts as the source of the reducing and capping agent. The hydrothermal extract of Spermacoceocymoides was mixed with silver nitrate to synthesize AgNPs.The synthesized silver nanoparticles characterized by using UV – vis absorption spectroscopy, Fourier transform infrared spectroscopy (FTIR), X- ray diffraction (XRD), scanning electron microscopy (SEM) with X-ray energy dispersive spectrophotometer (EDAX). The photocatalytic activity of silver nanoparticles wasevaluated on the basis of degradation of congo red dye under sunlight irradiation was observed.

Key words: Silver, Spermacoceocymoides, Green synthesis, Nanoparticles, SEM.

KINETIC AND MODELING OF THE DYESTUFF REMOVAL BY CHITOSAN NANOMATERIAL PRODUCED FROM MODIFIED CHITOSAN (CRAB SHELLS) BY RESPONSE SURFACE METHODOLOGY

V. GOMATHI PRIYA[1] BHUVANESWARI P[2], SHANMUGA VADIVU T[2], KRISHNAVENI R[3], S. VISWANATHAN*[1] & G. ANNADURAI[4]

[1]Post Graduate & Research Centre of Microbiology, Sri Paramakalyani College, Manonmaniam Sundaranar University, Alwarkurichi - 627412, India.

[2]JP College of Arts and Science, College Road, Agarakattu, Ayikudi -627 852. TamilNadu, India.

[3]Department of Commerce, Balagan Saraswathi Arts and Science College for Women, Manonmaniam Sundaranar University, Mukkudal - 627601, TamilNadu, India.

[4]Sri Paramakalyani Centre of Excellence in Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi - 627412, TamilNadu, India

***** Corresponding author: drsvmicro@gmail.com

The development of simple, effective, economical, and environmentally friendly methods for removing hazardous substances of anthropogenic origin from aquatic systems is currently one of the greatest challenges, among others, due to the variety of pollutants and the transformations they may undergo in the environment. In recent years, there has been an increased interest in adsorption methods based on the use of natural polymers, including non-toxic chitosan, Chitosan is produced from waste crab shells via demineralization (acid treatment) and deproteinization (alkaline treatment). Adsorption is the most widely used technique for advanced wastewater treatment. Chitosan is often used as an effective biomaterial in the adsorption world because of its numerous functional applications. Chitosan is one of the most suitable and functionally flexible adsorbents because it contains hydroxyl (-OH) and amine ($-NH_2$) groups. The adsorption capacity and selectivity of chitosan can be further improved by introducing additional functions into its basic structure. The results from isotherm models showed that the adsorption of dye on chitosan correlated well with Freundlich model, whereas the kinetics studies revealed that the adsorption process was fitted by pseudo-first-order for dye. These three independent variables acting on the adsorption performance of methylene blue were selected for optimization and modeling processes through a central rotating composite design using response surface methodology. The percentage of removal of methylene blue by chitosan prepared from Crab shells was

predicted with a second-degree polynomial equation, and the postulated model was valid and represented well the phenomenon studied in the experimental domain, with an R2 = 0.9934 and an RAdj = 0.9849.

Key Words: Crab Shells, Chitosan, methylene blue, Adsorption Studies, Equilibrium Studies

VALPROIC ACID CHANGES GENE EXPRESSION IN L-NAME HYPERTENSIVE RATS

T. RAJESHWARI*

Assistant Professsor & Head, Department of Biotechnology, Deen College of Arts & Science, Mayiladuthurai - 609 001, Tamil Nadu, India

**E-mail address: drrajiau@gmail.com*

The current study was designed to examine the modifying activity of valproic acid against L-NAME induced hypertension. Valproic acid modulates gene expression (ET-1) in hypertensive rats. Hypertension was prompted in adult male albino Wistar rats, considering 180–230 g, by oral administration of the L-NAME (40 mg/kg/ body weight/day) in drinking water for four weeks. Rats were cured with 100 mg/kg valproic acid for four weeks. A significant reduction in the levels of nitric oxide metabolites in aorta was perceived in hypertensive rats. The L-NAME rats revealed significant rise in the systolic blood pressure and heart rate. An activity of enzymic antioxidants such as SOD, CAT and GPx in erythrocyte and aorta was significantly reduced and ET-1 mRNA expression in aorta was significantly increased in L-NAME rats. Treatment with valproic acid carries back the above parameter to near normal level. The above outcomes were confirmed by the histopathological examination. Further, valproic acid displays antioxidant potential. These results suggest that valproic acid acts as an antihypertensive agent and modulates ET-1 expression against L-NAME induced hypertension.

Keywords: Hypertension, Valproic acid, Nitric oxide, Antioxidant, Endothelin-1

ROLE OF GRAPHENE QUANTUM DOTS IN IMPROVING THE ELECTROCHEMICAL PERFORMANCE OF SODIUM ALGINATE BIOPOLYMER ELECTROLYTES

N. VANITHA & T. ANANTHA KUMAR

Department of Physics & Chemistry, Merit Arts and Science College (affiliated to Manonmaniam Sundaranar University), Idaikal, Ambasamudram, Tirunelveli, Tamil Nadu, India.

In recent decades, Energy demand is improved substantially due to the depletion of fossil fuel etc. To overcome the issue, electrochemical energy storage and conversion devices can be developed with highly safe, eco-friendly and cost effective nature. In present work, Sodium Alginate (SA) with Ammonium Formate (AF) based biopolymer electrolytes incorporated with Graphene quantum dot (GQD) have been prepared using solution casting technique. Ac impedance measurement is done to find out the ionic conductivity of all prepared biopolymer electrolytes (BPEs). High ionic conductivity of 2.77×10-3 S cm-1 has been found for the compodition of 30 M.wt% SA + 70 M.wt% AF. After incorporating various compositions (0.25 ml, 0.5 ml and 0.75 ml) of GQD, the membrane 30 M.wt% SA+ 70 M.wt% AF + 0.5 ml GQD exhibits improved ionic conductivity of 2.78 ×10-2. The crystalline/amorphous nature of all prepared BPEs has been analyzed using XRD method and the membrane 30 M.wt% SA+ 70 M.wt% AF + 0.5 ml GQD shows high amorphous nature with decreased crystallinity percentage. The solid state proton conducting primary battery was constructed using highest conducting membrane and the battery shows voltage of 1.79 V.

Keywords: Sodium Alginate, Graphene Quantum Dot, Primary Battery

ANALYTICAL EVALUATION OF ACTIVE SECONDARY METABOLITES IN *SIDA ACUTA BURM*. F LEAVES USING GC-MS AND HPTLC TECHNIQUES

K. NANTHINI JOTHI[1] & P. MUNEESWARI[2]

Department of Biochemistry, K.R College of Arts and Science Kovilpatti, Tamilnadu, India

Sida acuta is one of the medically active plants used for the treatment of multifaceted diseases. However, an elaborated investigation on the phytochemical composition of the ethanolic extract of the leaves of this plant is yet to be deciphered. So, in this quantification of phytochemicals, in-vitro free radical scavenging activity, enzymatic and non-enzymatic

antioxidant levels in the fresh leaves, HPTLC fingerprinting and GC-MS analysis in the ethanolic extract of *Sida acuta* leaves were done. In-vitro antioxidant activities were assayed using DPPH, ABTS, nitric oxide, hydroxyl radical and ferric ions, while ascorbic acid is used as the standard. The results indicated the presence of flavonoids, tannins, phenols, and alkaloids in a reasonably good amount which has substantiated the results of HPTLC. All the tested antioxidants were present prominently in the leaves, specifically catalase and glutathione peroxidase, which may be responsible for the prominent radical scavenging tendency of the extract against the tested free radicals. The GC-MS analysis observed the presence of 35 different compounds each belonging to different classes such as sterols, flavonoids, terpenes, heterocyclic aromatic compounds, phenols, fatty acids, vitamins, alkaloids, and sesquiterpenoids. The results indicate that the ethanolic extract of *Sida acuta* leaves collected from the Tuticorin District of Tamil Nadu is an effective scavenger of free radicals and has the potential to be used as a natural antioxidant which is attributable to the rich presence of its secondary metabolites.

Keywords: *Sida acuta*, Sesquiterpenoids, Terpenes, Glutathione.

GREEN SYNTHESIS OF PLANT EXTRACT SUPPORTED SILVER NANOPARTICLES USING *CITRUS LIMONUM* PEEL, LEAF AND SEED EXTRACT AND THEIR ANTIBACTERIAL ACTIVITY

VENKATESHWARI R[1], BHUVANESWARI P[2], SHANMUGA VADIVU T[2], KRISHNAVENI R[3] & G. ANNADURAI[1]

[1]Sri Paramakalyani Centre of Excellence in Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi - 627412, Tamil Nadu, India

[2]JP College of Arts and Science, College Road, Agarakattu, Ayikudi -627 852. Tamil Nadu, India.

[3]Department of Commerce, Balagan Saraswathi Arts and Science College for Women, Manonmaniam Sundaranar University, Mukkudal - 627601, Tamil Nadu, India.

***** Corresponding author: gannadurai@msuniv.ac.in

The synthesis of silver oxide nanoparticles (AgNPs) through the use of plant extracts is a remarkably simple, cost-effective, efficient, and environmentally friendly approach. In recent years, there has been a surge in the exploration of eco-friendly methods for synthesizing AgNPs, with researchers addressing the potential of extracts derived from various plant components, including leaves, stems, roots, and fruits. The current work

concentrated on the green synthesis of silver nanoparticles (AgNPs) through the use of aqueous *Citrus limonum* bark, leaf and seed extract, optimizing the different experimental factors required for the formation and stability of AgNPs. FTIR spectra confirmed that *Citrus limonum* bark; leaf and seed extract acted as both reducing and surface passivation agent for the synthesized AgNPs. The morphology, size, and elemental composition of AgNPs were investigated by SEM analysis, which showed crystalline spherical silver nanoparticle by XRD analysis. In addition, the antimicrobial and antioxidant properties of this bioactive silver nanoparticle were also investigated. The AgNPs showed excellent antibacterial activity against one (Gram Positive) pathogenic bacteria *Bacillus cereus* and (Gram Negative) *Pseudomonas aeruginosa*. These results indicated a simple, fast, and inexpensive synthesis of silver nanoparticles using the *Citrus limonum* bark, leaf and seed extract that has promising antibacterial activity.

Keywords: Silver Nanoparticle, *Citrus limonum* green synthesis, Plant extract, Bark, Leaves, Seed

PHYTOCHEMICAL PROFILING AND IN SILICO SCREENING OF *AMARANTHUS SPINOSUS* FOR POTENTIAL ANTI-BREAST CANCER COMPOUNDS WITH SUBSEQUENT IN VITRO VALIDATION IN MCF-7 CELLS

SYLVIA A, SUMETHA K, SAMIKSHA K & MAHALAKSHMI M

Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu.

Phytochemical profiling, combined with computational and experimental approaches, offers an efficient strategy for identifying novel anticancer agents from medicinal plants. The present study explores *Amaranthus spinosus* for its potential anti-breast cancer activity through a sequential workflow involving phytochemical analysis, in silico screening, and in vitro validation. Phytochemical profiling of *A. spinosus* was carried out using gas chromatography–mass spectrometry (GC–MS), which identified diverse bioactive compounds, including flavonoids, phenolics, fatty acid derivatives, and terpenoid constituents. The identified compounds were subsequently filtered using in silico ADMET (absorption, distribution, metabolism, excretion, and toxicity) analysis to shortlist molecules with favourable drug-likeness and safety profiles. ADMET-filtered compounds were then subjected to molecular docking studies against key breast cancer–related molecular targets, including estrogen receptor alpha and other proteins involved in tumour growth and survival, to evaluate binding affinity and interaction patterns. The ligand exhibiting the highest

docking score and stable interaction profile was further analysed using molecular dynamics simulation to assess the stability, flexibility, and conformational behaviour of the protein–ligand complex under physiological conditions. Based on the computational findings, experimental validation was performed using the estrogen receptor–positive MCF-7 breast cancer cell line. The cytotoxic potential of the selected compound and plant extract was assessed using cell viability assays, and morphological alterations indicative of apoptosis were examined through microscopic analysis. The in vitro results demonstrated a significant, dose-dependent reduction in MCF-7 cell viability, supporting the predicted anticancer activity observed in the in-silico studies.

Keywords: *Amaranthus spinosus*, MCF-7, in-silico studies, MTT assay, breast cancer

INVESTICATION ON WILDED *Tinospora crispa* (PERUMSEENDHIL): A POTENTIAL ANTIINFLAMMATORY MEDICINAL PLANT

HEMAMALINI. V[1], S. JEEVITHA[1], G. MANIMEGALA[1*], K. JAYACHANDRAN[2] & M. SUSILADEVI[3]

[1]*Research scholar, PG & Research Department of Zoology, Government Arts College – (Grade -1) C-Mutlur, Chidambaram, Tamilnadu, India*

[2]*Department of Zoology, Annamalai University, PG Extension Centre, Villupuram-1, Tamilnadu, India*

[3]*Department of Zoology, Immaculate College for Women, (Arts and Science), Chinnakanganankuppam, Cuddalore, Tamilnadu, India*

*Corresponding author: megalasunil@yahoo.com

The present study aimed to analyse the anti-inflammatory activity of silver nanoparticle particles synthesized using *Tinospora crispa* (TS) extract. The Plant extract-based silver nanoparticles were tested for its anti-inflammatory activity by protein denaturation assay. The standard anti-inflammatory used was diclofenac sodium. The results obtained were collected and statistically analyzed in SPSS software and graphs were obtained. Form the results of silver nanoparticles synthesised using *Tinospora crispa* (TS) showed highest absorbance value at a concentration of 10 microliter (102 nm) when subjected to albumin denaturation assay to check for its anti-inflammatory activity. This study concluded *Tinospora crispa* extract-synthesized silver nanoparticles showed promising anti-inflammatory properties in vitro, suggesting their potential use in treating inflammation-

related conditions. Further research is necessary to evaluate their clinical application and ensure their safety for therapeutic use.

Keywords: Anti-inflammatory, albumin denaturation assay, *Tinospora crispa*, Innovative technique

IL-12–ARMORED CAR-T CELLS TARGETING FOLR2 OR TREM2 REPROGRAM THE TUMOR MICROENVIRONMENT AND CONTROL METASTATIC CANCER

GOWSALYAPONNURAJ, SARANYA MUTHURAJ, & NANDAGOPAL SUBRAMANIYAM*

Department of Biochemistry, K. R. College of Arts & Science, K. R. Nagar, Kovilpatti – 628 503, Tuticorin District, Tamil Nadu, India

Tumor-associated macrophages (TAMs), frequently characterized by expression of FOLR2 or TREM2, are abundant in solid tumors and contribute to an immunosuppressive tumor microenvironment (TME). In this study, we develop IL-12–secreting CAR-T cells directed against FOLR2 or TREM2 to eliminate pro-tumor TAMs and reprogram the TME. Administration of IL-12–armored anti-TAM CAR-T cells results in markedly enhanced survival in metastatic ovarian and lung cancer models. Therapeutic efficacy is achieved at low cell doses, without lymphodepletion, and CAR-T activity remains largely confined to tumors with no evident toxicity. Spatial transcriptomic analyses demonstrate that IL-12 anti-TAM CAR-T cells induce durable remodeling of the TME, persisting beyond CAR-T cell contraction, characterized by expansion of $CXCL9^{+}$ immunostimulatory macrophages and endogenous tumor-specific cytotoxic T cells. Tumor eradication is partially dependent on FAS expression by cancer cells, identifying an IL-12–FAS signaling axis underlying IL-12–armored CAR-T function. Collectively, these results establish IL-12–producing, myeloid-targeted CAR-T cells as a broadly applicable strategy to reshape the TME and promote anti-tumor immunity in solid malignancies.

IN-VITRO EVALUATION OF A REPURPOSED DRUG ADJUVANT TO IMPROVE MEROPENEM ACTIVITY AGAINST CARBAPENEM RESISTANT *Pseudomonas aeruginosa*

SIDDHARTHAN K, LAVANYA S, SAKTHI SRI R & BALAMURUGAN A

Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu.

The present invention relates to a synergistic antimicrobial effect for restoring the efficacy of meropenem against carbapenem-resistant *Pseudomonas aeruginosa* using a repurposed drug adjuvant. The invention employs an integrated in-silico and in-vitro screening approach to identify FDA-approved drug molecule capable of interacting with key resistance associated proteins of *P.aeruginosa*, like carbapenemase enzyme. In the first phase, a virtual screening workflow is used to evaluate docking affinity, binding stability, and interaction profiles of approved drugs against selected resistance targets. The selected compounds are subsequently subjected to in-vitro validation using carbapenem-resistant clinical isolates of *P.aeruginosa* and MTCC strain. The experimental evaluation includes determination of minimum inhibitory concentrations, checkerboard assays to analyse synergistic interaction with meropenem, biofilm inhibition assay, hydrophobicity, Time kill and cartwheel. The combination of meropenem with the identified repurposed drug adjuvant demonstrates enhanced antimicrobial activity, reflected by reduced minimum inhibitory concentrations and greater disruption of bacterial survival mechanisms. By targeting resistance pathways and improving the functional activity of meropenem, this invention offers a promising therapeutic enhancement of meropenem for the management of infections caused by carbapenem-resistant *P.aeruginosa*.

Keywords: Meropenem, Carbapenem-resistant, *Pseudomonas aeruginosa*, Repurposed drug, FDA-approved drug molecule.

PRELIMINARY PHYTOCHEMICAL EVALUTION AND ASSESSMENT OF FREE RADICAL SCAVENGING POTENTIAL OF THE CHLOROFORM EXTRACT DERIVED FROM *SIDA ACUTA BURM*. F.

B. KALAIVANI & P. MUNEESWARI*

Department of Biochemistry, K.R.College of Arts and Science Kovilpatti, Tamilnadu, India

Sida acuta is one of the India medicinal plants which belong to the family Malvaceae. The whole plant is reported to have many biological activities such as abortifacient, anthelmintic, antiemetic, demulcent, diuretic, aphrodisiac, stomachic, diaphoretic, antipyretic and wound healing properties. Therefore main aim of the present study is to evaluate the phytochemical constituents and the free radical scavenging properties of the chloroform extract of *Sida acuta*. Screening of phytochemical constituents and free radical scavenging potential were analyzed by DPPH radical scavenging assay, Nitric oxide radical scavenging assay, Hydroxyl radical scavenging assay, Reducing power assay and FRAP assay. The preliminary phytochemical screening has shown the presence of Steroids, flavonoids, tannins and Glycosides. The chloroform extract of *Sida acuta* hold restrained free radical scavenging activities. Based on the results this study can be concluded that, *Sida acuta* has rich free radical scavenging activities, may be which the presence these secondary metabolites in it. In future by isolating and identifying these compounds, if may be used to treat various diseases.

Keywords: *Sida acuta*, Chloroform extract, phytochemical screening and Free radical scavenging activity.

EVALUATION OF GASTROPRODUCTIVE AND ANTIULCER EFFICIENCY OF DIFFERENT EXTRACTS OF *Coccinia grandis* LINN.VOIGT IN PYLORIC LIGATION INDUCED ULCERS IN RATS

PITCHAMMAL ALIAS MYTHILI K & BHUVANESWARI SANTHARAM*

Department of Biochemistry, K.R.College of Arts and Science, Kovilpatti, Tamil Nadu.

Cocemie grandis Linn, otherwise called *Coccinia indica* has been used in ayurvedic medicine in India and Sri Lanka to treat diabetes. As there is no indication of publications regarding the anti ulcer property of the plant the present study was designed to investigate the antiulcer potential of ethanolic, aqueous and total aqueous extracts of *Coccinia grandis* Linn. Ulcer was induced by pylorus ligature in Wistar albino rats. Drugs were administered in two different dose levels (200mg/Kgbwt, 400mg/ Kigw). Though all three extracts of Coccinia grandis, dose dependently reduced, the total acidity, ulcer index, and increased pH of gastric juice ethanol extracts exhibited markedly significant results. However, ethanol extract has shown (78.57%) a highly significant ulcer curative potential and decreased ulcer formation also. A preliminary phytochemical analysis revealed the presence of different phytoconstituents such as alkaloids. Carbohydrate glycosides, phyto sterol, saponins, volatile

oil, tannins etc., which may impart their anti ulcer activity by acting as anti secretory and cytoprotective agents. The present result suggests that both anti-secretory and cytoprotective mechanisms of different extracts of *Coccinia grandis* exerted protective effect. However further studies are required to propose the mechanism of action of the extracts for their human use.

Keywords: Antiulcer activity, *Coccinia grandis*, pylorus ligature, Antisecretory, Cytoprotective

ANTI-INFLAMMATORY AND ANTIOXIDANT PROPERTIES OF COPPER NANOPARTICLES BIOGENICALLY SYNTHESIZED WITH *Salacia reticulata*

JEEVARASIKA.B[1], N. RAJASEKAR[1], R.MOHANAMBAL[1*] K. JAYACHANDRAN[2] & M. SUSILADEVI[3]

*[*1]PG & Research Department of Zoology, Thiru Kolanjiappar Government Arts College (Grade-1), Virudhachalam-1 Tamilnadu, India*

[2]Department of Zoology, Annamalai University Post Graduate Extension Centre, Villupuram-1, Tamilnadu, India

[3]Department of Zoology, Immaculate College for Women (Arts and Science), Cuddalore-1, Tamilnadu, India

*Corresponding author: Email: rmohanambal72@gmail.com

To determine the anti-inflammatory and antioxidant activity of copper nanoparticles synthesized using *Salacia reticulata* (SR). The preparation of the *Salacia reticulata* extract, synthesis of copper nanoparticles, preparation of nanoparticles powder and then antioxidant and anti-inflammatory activity of nanoparticles were analysed. Antioxidant activity and anti-inflammatory activity was assessed using DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) assay and inhibition of albumin denaturation assay. The formation of copper nanoparticles was indicated by the peak found in the spectroscopy. Copper nanoparticles synthesized using Salacia reticulate showed highest absorbance at a concentration of 50µl (85%) when it was subjected to DPPH assay to check for its antioxidant property at a wavelength of about 517nm. Copper nanoparticles synthesized using *Salacia reticulata* (SR) showed highest absorbance at a concentration of 50µl (90.2%) when it was subjected to inhibition of albumin denaturation assay to analyse for its anti-inflammatory activity at a wavelength of about 660 nm. The present study suggests that *Salacia reticulata* mediated copper nanoparticles showed good antioxidant activity and anti-inflammatory activity. It can be concluded that the

antioxidant activity of *Salacia reticulata* is not as efficient as Diclofenac but it can be more efficient when its concentration is raised to safe levels and anti-inflammatory activity of *Salacia reticulata* is as efficient as Diclofenac.

Keywords: Copper nanoparticles, *Salacia reticulata*, antioxidant, anti-inflammatory, green synthesis, innovative

EXPLOITATION OF EFFECTIVE MICROORGANISM FOR BIOREMEDIATION OF HEAVY METAL CONTAMINATED SOIL

DEEPIKADEVI M, NANDHINI G, PADMAPRIYA S & VARSHINI P

Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu.

Significant environmental contaminants called heavy metals accumulate in soil and disrupt its natural processes. They have long-term negative effects on plants, groundwater, animals, and people by altering soil and water chemical structure, inhibiting beneficial microorganisms, decreasing nutrient availability, and eventually lowering soil fertility. The bulk of heavy metal inputs into soil originate from anthropogenic activities like mining, metal plating, smelting, foundry operations, and other production processes that discharge dangerous metals into the environment. Moreover, smoke from vehicle emissions and the burning of fossil fuels both increases the deposition of metals onto nearby soils. Compared to typical agricultural fields, soils recovered from electroplating and foundry sites often have higher concentrations and a wider variety of heavy metals. Metal contamination spreads to nearby lakes, agricultural lands becomes contaminated through overflowing or improperly disposed of solid waste or industrial effluents. In order to restore soil health in areas affected by heavy metals, this study uses bioremediation with a commercially available Effective Microorganisms (EM) consortium. The main goal is to determine whether these microbes may improve soil biological activity and lower heavy metal concentrations, offering an environmentally beneficial way to manage contaminated areas. ICP-OES is used to examine soil samples after treatment in order to measure the kinds and concentrations of heavy metals. In order to confirm the effectiveness of remediation, common soil parameters such as pH, electrical conductivity, and organic matter content are evaluated for both pre- and post-treatment samples.

Keywords: heavy metal contaminated soil, Effective Microorganism (EM), ICP-OES.

COMPUTATIONAL MOLECULAR DOCKING INVESTIGATION FROM *INDIGOFERA* THIRUNELVELI SANJAPPA TARGETTING HEPATOCARCINOMA - ASSOCIATED RECEPTOR

K. VASUMATHI & Dr. S. SUBBURAYALU*

Department of Biochemistry, K.R College of Arts and Science, Kovilpatti, Tamilnadu, India

Hepatocarcinomo keeps on being an overall executioner, in spite of the huge measure of research and quick advancements seen amid the previous decade. Since it is normally trusted that many are preventable, there is dire need to recognize regular meds as viable hepatoprotective specialists. Normal items recognized and disengaged from plants have assumed an imperative job in disclosure of medications against liver infections. Methods: In silico docking systems are being utilized to explore the correlatively at the sub-atomic dimension of a ligand and a protein target. In the present Investigation, four ligands which have been disengaged and distinguished from the ethanolic concentrate of the entire plant of *Indigofera* tirunelveli Sanjappa are docked with two novel hepatocacrcinomo receptors, Hepatitis B X and Heme OxygenaseI Results Out of the four phytochemical constituents separated and distinguished from the ethanolic concentrate of the entire plant of Indigofera tirunelvelica phytol ligand uncovered the best wellness score contrasted and the other three ligands. This present examination induced that phytol could be a viable potential inhibitor against Hepatitis B X and Heme Oxygenase i receptor and could be assessed as hepatoprotective medication particle.

Keywords: *Indigofera* tirunelveli, In silico, Autodock, Hepatocarcinomo receptors

DEVELOPMENT OF PLANT-BASED HYDROGEL INCORPORATED WITH MULTI-WALLED CARBON NANOTUBES FOR DIABETIC WOUND INFECTION AND HEALING

NANDHINI R[1], CALISTA STEPHANIE A[1], ANUGRAHA J[1], VYSHALI S[1], Dr. T. SHARMILA RAJ[1*] & KARUKUVELRAJA R[2*]

*[*1]Department of Biotechnology, Sri Shakthi Institute of Engineering and Technology, Coimbatore*

[2]Genolites Research and Development Laboratory, Coimbatore*

A percentage of Kattukodi gel was employed as the polymeric scaffold to develop a herbal-mediated hydrogel for the treatment of diabetic wound infections and the acceleration of tissue repair Citric acid functioned simultaneously as a binder and stabilizer, providing structural cohesion and controlled release of bioactive constituents. These crude plant extracts Prickly pear (*Opuntia ficus-indica*), and Kattukodi (*Cocculus hirsutus*) were incorporated with multi-walled carbon nanotubes in an equimolar ratio to modulate abscisic-acid (ABA) levels and stimulate cellular proliferation. Kattukodi extracts were obtained by ethanol maceration, whereas Prickly pear extracted with aqueous citric acid. The resulting hydrogel was characterized physico-chemically (FTIR, XRD, DLS, SEM) to conform matrix integrity, homogeneity, and appropriate porosity. Antibacterial efficacy against predominant diabetic-wound pathogens was evaluated through MIC, MBC, and biofilm inhibition assays, demonstrating potent antimicrobial activity. Cytocompatibility and wound-closure potential were assessed using L929 fibroblast scratch assays, revealing significant enhancement of cell migration and proliferation. Overall, the herbal-based hydrogel exhibits a synergistic combination of strong antimicrobial properties, favourable mechanical and morphological characteristics, and pronounced pro-regenerative effects, positioning it as a promising, biocompatible dressing for managing infected diabetic wounds.

Keywords: Prickly pear, Kattukodi, multi-walled carbon nanotube, herbal-based hydrogel, diabetic-wound.

IN-VIRTO IRON NANOPARTICLES SYNTHESIZED FROM *Senna auriculata* LEAF EXTRACT ARE ANTIOXIDANT AND ANTIDIABETIC PROPERTIES

JEEVITHA. S[1], V. HEMAMALINI[1], G. MANIMEGALA[1*], K. JAYACHANDRAN[2] & M. SUSILADEVI[3]

*[*1]PG& Research Department of Zoology, Government Arts College – (Grade -1) C-Mutlur, Chidambaram, Tamilnadu,India*

[2]Department of Zoology, Annamalai University, PG Extension Centre, Villupuram-1, Tamilnadu, India

[3]Department of Zoology, Immaculate College for Women, (Arts and Science), Chinnakanganankuppam, Cuddalore, Tamilnadu, India

***Corresponding author:** megalasunil@yahoo.com

Avartaki (*Senna auriculata* (L.) Roxb. syn. Family- Fabaceae) is a traditional medicinal plant, widely used for the treatment of various ailments in Ayurveda and Siddha system of medicine in India. Almost all the parts of the plant, such as flowers, leaves, seeds, barks, and roots have been reported for their medicinal uses. Traditionally, it has been used in the treatment of diabetes, asthma, rheumatism, dysentery, skin disease, and metabolic disorders. The extracts from its different parts and their isolated compounds possess a wide range of pharmacological activities such as antidiabetic, antioxidant, anti-inflammatory, antihyperlipidemic, hepatoprotective,nephroprotective, cardioprotective, anti-atherosclerotic, anticancer, antimutagenic, antimicrobial, antiulcer, antipyretic, anthelmintic, immunomodulatory, antifertility, anti-venom, and anti-melanogenesis. Moreover, the nanoparticles demonstrated strong antioxidant activity, as evidenced by their effective inhibition in antioxidant properties, as evidenced by DPPH activity (82.59 ± 1.34 %), ABTS activity (76.34 ± 1.27 %), and H_2O_2 activity (72.54 ± 1.19 %) at a concentration of 250 µg/mL. Their potential as anti-diabetic agents was also explored, with assessments of their inhibitory effects on α-Amylase and α-Glucosidase enzymes. The iron nanoparticles, often derived from *S. auriculata* (known as "*Tanner's Cassia*" or "Avaram" in traditional medicine), exhibit notable inhibitory effects on enzymes associated with diabetes, such as -amylase, leading to significant anti-hyperglycemic effects. In conclusion, this study demonstrated that Fe_2NPs possess favorable characteristics and significant potential for various biomedical applications.

Keywords: Iron nanoparticle, *Senna auriculata*, Antidiabetic, Antioxidant, Innovative technique

ISOLATION AND NEUROPROTECTIVE POTENTIAL OF PROBIOTIC STRAINS FROM *SPATHODEA CAMPANULATA* NECTAR

HARSHAVARDHINI V. S, MADUMITHA G, MONICA S, & RAMYA S

Sri Shakthi Institute of Engineering and Technology, Coimbatore

This research focuses on the extraction, analysis, and potential neuroprotective qualities of probiotic strains sourced from the nectar of *Spathodea campanulata*, a tropical decorative plant recognized for its floral secretions rich in bioactive compounds. Nectar samples were gathered and analysed to identify beneficial bacteria that can endure acidic environments, bile salts, and demonstrate strong antimicrobial efficacy. The chosen isolates underwent further examination for functional probiotic characteristics such as antioxidant

properties, enzyme production, and the synthesis of neuroprotective metabolites. Their protective roles were assessed with in vitro models of neuronal cells subjected to oxidative and inflammatory stress, revealing that the isolates notably improved cell survival, decreased reactive oxygen species, and mitigated neuronal harm. The results indicate that the nectar of *Spathodea campanulata* serves as an uncharted natural source for discovering effective plant-based probiotic strains useful in treating neurodegenerative disorders. This research emphasizes the importance of floral microbiomes as promising sources of innovative bioactive probiotics.

Keywords: *Spathodea campanulata*, nectar probiotics, microbial isolation, neuroprotective activity, antioxidant potential, neuronal cell protection, bioactive metabolites, neurodegeneration

MACHINE LEARNING IN FORENSIC TOXICOLOGY: CONCEPTS, APPLICATIONS, AND CHALLENGES

N. SIRAJ NISHA

Department of Computer Science & Computer Applications, Jawaharlal Nehru College for Women, Pali, Ulundurpet.

E-Mail: sirajsherin786@gmail.com

Forensic toxicology plays a critical role in legal investigations by detecting and interpreting drugs, poisons, and metabolites in biological samples. Recent advances in analytical chemistry and high-resolution instrumentation generate complex datasets that require advanced computational approaches. Machine learning (ML) provides powerful tools for analyzing toxicological data, predicting molecular properties, estimating post-mortem intervals, and supporting forensic decision-making. This paper presents a comprehensive review of machine learning applications in forensic toxicology, including bio analysis, metabolomics, toxic kinetics, toxic dynamics, and predictive modeling. Challenges such as limited datasets, lack of standardization, over fitting risks, and legal admissibility are also discussed. Finally, future directions for integrating explainable artificial intelligence, standardized datasets, and interdisciplinary collaboration are outlined to enhance forensic reliability.

Keywords: Machine learning, forensic toxicology, artificial intelligence, HRMS, metabolomics, QSAR, predictive modeling.

NON-ISOTHERMAL DECOMPOSITION KINETICS OF 5-ETHOXYCARBONYL-6-METHYL-4-PHENYL- 3,4-DIHYDROPYRIMIDIN-2(1H)-ONE (EMPDP) UNDER NITROGEN ATMOSPHERE

P. POONTHALIR[1] and G. MANIKANDAN[*1,2]

[1]PG & Research Department of Chemistry, Thiru Kolanjiappar Government Arts College, Virudhachalam- 606 001.

[2]Department of Chemistry, Annamalai University, Annamalainagar-608002.

[*] Corresponding author E-mail: phdmani@gmail.com

5-Ethoxycarbonyl-6-methyl-4-phenyl- 3,4-dihydropyrimidin-2(1H)-one (EMPDP) have been synthesized and characterized by microanalysis, FT-IR, mass spectra and NMR (^{1}H and ^{13}C) techniques. The thermal decomposition of EMPDP was studied by TGA and DTA under static nitrogen atmosphere at different heating rates of 10, 15 and 20 K min^{-1}. The kinetic parameters were calculated using model-fitting (Coats-Redfern, CR) and model-free methods (Friedman, Kissinger-Akahira-Sunose, KAS and Flynn-Wall-Ozawa, FWO). The decomposition process of EMPDP followed single step mechanism as evidenced from the data. The existence of compensation effect was noticed for the decomposition of EMPDP. Invariant kinetic parameters are consistence with the average values obtained by Friedman and KAS isoconversional method for EMPDP. The most probable kinetic model for decomposition of the compound is P2 (Power law).

Keywords: Thermal decomposition; Kinetic parameters; Model-fitting; Model-free analysis, Isoconversional

STUDY ON FREE RADICAL SCAVENGING PROPERTIES OF VARIOUS EXTRACTS OF *CALYCOPTERIS FLORIBUNDA* WHOLE PLANT UNDER IN VITRO CONDITIONS

M. SINDHU & BHUVANESHWARI SANTHARAM[*]

Department of Biochemistry, K.R.College of Arts and Science Kovilpatti, Tamilnadu, India

The present research was subjected to screen the free radical scavenging activity of various extracts of whole plant of colycopteris floribunda by different in-vitro modles. The antioxidant activity was evaluated by hydroxyl radical scavenging activity, nitic oxide radical

scavenging activity with reference standard ascorbate and total phenol content respectively. An inhibitory concentation 50% [IC_{50}] value was found ethyl acetate of *C.floribunda* is more effective in hydrosyl radical scavenging activity than that of methanolic and petroleum ether. The IC_{50} values of ethyl acetate extract of *C.floribunda* and ascorbate were found to be 530µg/ml and 410 µg/ml respectively. The ethyl acetate extract of *C.floribunda* was found more effective in nitric oxide scavenging activity. The IC_{50} values of ethyl acetate extract *C.floribunda* and ascorbate were to be 570µg/ml and 410µg/ml respectively. But when compared to all the three extracts with ascorbate [standard], the ethyl acetate extract of *C.floribunda* showed the better result. In addition, the ethyl acetate extract *of C.floribunda* was found to contain a noticeable amount of total phenols, which play a major role in controlling antioxidants. The results were observed in a concentration dependent manner. Our findings revealed that ethyl acetate extract of *C.floribunda* possesses interesting antioxidants activity, which may provide production against free radicals induced damage biomolecules.

Keywords: *Calycopteris floribunda*, Antioxidant, Ascorbate, Scavenging activity, Inhibitory concentration 50%

RESILIENT PRECISION: LEVERAGING MULTIMODAL AI FOR CLIMATE ADAPTIVE AGRICULTURE

S. MANIKANDAN[1*], M. PRIYADHARSHINI[2], S. ANSAR ALI[3] & G. M. ALAGU LAKSHMANAN[4]

[1]Assistant Professor, Dept of Botany, Govt Arts & Science College, Tittagudi 606 106

[2]Assistant Professor in Agri Biotech, JSA College of Agriculture & Technology, Ma. Podaiyur, Avatti 606 108

[3]Assistant Professor, Dept of Botany, Govt Arts & Science College, Vanur 605 111

[4]Associate Professor, Dept of Botany, ThiruKolanjiappar Govt Arts College, Virudhachalam, 606 001

Global Agriculture faces the dual challenge of feeding a growing population while mitigating the impacts of increasing climate volatility and resource scarcity. In 2026, the transition from reactive to proactive farm management is driven by the integration of multimodal Artificial Intelligence (AI). This research explores the deployment of a unified AI framework that synthesizes data from satellite imagery, localized IoT soil sensors, and real time weather forecasts to optimize resource allocation. The methodology utilizes Transformer based architecture capable of processing disparate data streams to provide "Plant-by-Plant"

prescriptions. Field trials conducted across diverse agro ecological zones demonstrate that this AI-driven approach reduces chemical herbicide consumption by up to 65% and enhances water-use efficiency by 30% compared to traditional broadcast methods. Furthermore, the study evaluates the role of Generative AI in democratizing expert knowledge, providing smallholder farmers with natural language interfaces to access complex predictive analytics. The results indicate that while technical barriers remain, the synergy of Edge computing and Cloud-based AI models offers a scalable path toward "Resilient Precision."

Keywords: Precision Agriculture, Multimodal AI, Climate Resilience, Digital Twins, Sustainable Intensification.

DESIGN OF $NiTiO_3$/G-C_3N_5 HETEROJUNCTION NANOCOMPOSITE FOR ENHANCED PHOTOCATALYTIC DEGRADATION AND DETOXIFICATION OF IMIDACLOPRID: MECHANISTIC, KINETIC AND ZEBRAFISH TOXICITY EVALUATION

PUSHPALAKSHMI ELANGO & ANNADURAI GURUSAMY*

Sri Paramakalyani Centre of Excellence in Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi - 627412, Tamil Nadu, India

Corresponding author E-mail: gannadurai@msuniv.ac.in, annananoteam@gmail.com

There are major health and environmental issues when neonicotinoid pesticides, like imidacloprid, pollute aquatic habitats over time. This study effectively created a novel $NiTiO_3$/g-C_3N_5 heterojunction nanocomposite for the effective photocatalytic destruction of imidacloprid when exposed to UV light. Through the use of XRD, FTIR, UV-Vis DRS, PL, BET, SEM-EDX, and TGA investigation, the material characteristics were thoroughly examined. In comparison to bare $NiTiO_3$ and g-C_3N_5, the composite had lower band gap energy (3.0 eV) and a lower PL intensity, indicating the heterojunction nanocomposite's enhanced charge separation efficiency. Under ideal circumstances (50 mg catalyst dosage, pH 5, 10 mg/L concentration), the photocatalytic activity demonstrated significant degradation efficiency, with around 90% imidacloprid degradation in 90 minutes. The deterioration had strong correlation coefficients (R2 > 0.99) and pseudo-first-order kinetics. The effective generation of reactive oxygen species (•OH and O_2•$^-$) and the inhibition of electron-hole recombination at the $NiTiO_3$/g-C_3N_5 interface are credited with the increased activity. Zebrafish (Danio rerio) embryo toxicity tests showed a significant detoxifying effect after

photocatalytic therapy, as shown by the restoration of normal embryonic development and a reduction in morphological defects. The composite material also demonstrated strong antibacterial activity and maintained a high degree of stability during three reuse cycles in a row. The findings show that $NiTiO_3$/g-C_3N_5 is a stable, effective, and environmentally benign photocatalyst for the long-term breakdown of pesticides in aquatic environments.

AN INVESTIGATION OF HEAMATOLOGICAL STUDIES OF MEDICINAL PLANT *Hydrophila auriculata* IN FRESHWATER FISH *Labeo rohita*

N.RAJASEKAR[1], R. MOHANAMBAL*, K. JAYACHANDRAN[2] & M. SUSILADEVI[3]

*[*1]PG & Research Department of Zoology, Thiru Kolanjiappar Govt.Arts College, Vriddhachalam, Tamilnadu, India*

[2]Department of Zoology, Annamalai University, PG Extension Centre, Villupuram Tamilnadu, India

[3]Department of Zoology, Immaculate College for Women, Chinnakanganamkuppam, Cuddalore Tamilnadu, India

Hygrophila auriculata, belonging to the family Acanthaceae, is a promising medicinal plant with great economic potential. The medicinal value of *H. auriculata* has been appreciated in the ancient medical literature. The plant has been reported to contain flavonoids, alkaloids, aliphatic, esters, minerals, sterols, triterpenes lupeol, hentricotane, betulin, luteolin. Earlier scientific investigation reported bioactivities are anti-inflammatory, antipyretic, diuretic, demulcent, refrigerant and erythropoietic activities. The present study investigates the effects of Supplementary diet *Hydrophila auriculata* on the growth, survival, biochemical and haematological parameters of Labeo rohita. Fish were fed with supplementary diet *H. auriculata* exhibited significant difference ($P < 0.05$) in the growth performance, haematological indices such as RBC count, haematocrit volume, haemoglobin, WBC, MCV, MCH and MCHC concentration in contrast to the control after a period of 8 weeks. The results indicated that the parameters of the infected fish gradually improved from abnormal to normal levels at the cessation of the 28th day of experiment in the blood of fish. This change might be attributed to the intake of *H. auriculata leaf* powder, containing feed. The results of the present investigation apparently suggested that the selected plant's leaf powder had curative potential against *Hydrophila auriculata* infected *L. rohita* fingerlings. Therefore, it may be concluded that the *Hydrophila auriculata* 2.0 g

concentration in the diet of *L. rohita* fingerlings can be fed to cure the bacterial infection, particularly, *Hydrophila auriculata.*

Keywords: *Hydrophila auriculata*, Haematological, *Labeo rohita*, Bacterial infection

ADSORPTION BEHAVIOR OF DYE FROM AQUEOUS SOLUTION USING POMELO PEEL WASTE: BATCH EQUILIBRIUM STUDIES

PRIYANGA M, SORANAM R* & G. ANNADURAI*

Sri Paramakalyani Centre of Excellence in Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi - 627412, India

*Corresponding author E-mail: gannadurai@msuniv.ac.in, soranamr@gmail.com

This study investigates the adsorption behavior of synthetic dyes from aqueous solutions using pomelo peel waste as a low-cost biosorbent in batch equilibrium experiments. The effects of key parameters, including initial dye concentration, contact time, solution pH, adsorbent dosage, and temperature, were systematically evaluated. Equilibrium data were analyzed using Langmuir, Freundlich, and Temkin isotherm models, while adsorption kinetics were assessed via pseudo-first-order, pseudo-second-order, and intraparticle diffusion models. Results indicate that pomelo peel exhibits significant adsorption capacity for cationic dyes, with equilibrium achieved within a few hours. The adsorption process fits well with the Langmuir isotherm and follows pseudo-second-order kinetics, suggesting monolayer chemisorption on the peel surface. Thermodynamic analysis reveals the process is spontaneous and endothermic, with increased randomness at the solid–solution interface. The findings demonstrate that pomelo peel waste is an effective, environmentally friendly, and economical biosorbent for dye removal from aqueous solutions, offering potential applications in wastewater treatment.

Keywords: pomelo peel waste, Adsorption, cationic dyes, monolayer chemisorptions

SYNTHESIS AND CHARACTERIZATION OF ZRO_2 COUPLED ZN-DOPED G-C_3N_4 HETEROJUNCTION FOR EFFICIENT VISIBLE-LIGHT PHOTOCATALYSIS

NAGESHWARI V & G. ANNADURAI*

Sri Paramakalyani Centre of Excellence in Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi - 627412, India

The development of efficient visible-light-driven photocatalysts for environmental remediation has gained significant attention due to increasing water pollution caused by industrial dye effluents. In this work, a novel heterostructure photocatalyst composed of zirconium dioxide (ZrO_2) integrated with zinc-doped graphitic carbon nitride (Zn–g-C_3N_4) was successfully synthesized via a facile hydrothermal and thermal polymerization approach. Zirconium dioxide was coupled with Zn-doped Graphitic carbon nitride to enhance visible-light absorption and suppress rapid charge carrier recombination. The structural, morphological, and optical properties of the synthesized ZrO_2/Zn–g-C_3N_4 nanocomposite were systematically characterized using XRD, FTIR, SEM, transmission electron microscopy (TEM), UV–Vis diffuse reflectance spectroscopy (DRS), Brunauer–Emmett–Teller (BET) and photoluminescence (PL) analysis. The photocatalytic performance of the prepared catalyst was evaluated through the degradation of Methylene blue under visible light irradiation. The ZrO_2/Zn–g-C_3N_4 nanocomposite exhibited significantly enhanced photocatalytic activity compared to pristine g-C_3N_4 and ZrO_2, achieving superior degradation efficiency due to improved charge separation efficiency and extended light absorption range. The prepared ZrO_2/Zn–g-C_3N_4 nanocomposite demonstrates excellent stability and reusability over multiple cycles, indicating its potential as an efficient and sustainable photocatalyst for wastewater treatment applications.

Keywords: Hydrothermal, Thermal polymerization method, Photocatalytic degradation, methylene blue, ZrO_2/Zn-g-C_3N_4 heterostructure

GROWTH ENHANCEMENT OF *CAPSICUM ANNUM* L. USING *ULVA INTESTINALIS* SEAWEED LIQUID BIOFERTILIZER

GANDHIMANIYAN KRISHNAN[1]* & SUBRAMANIAN MANIMARAN[2]

[1]Guest Lecturer, Department of Microbiology, Bharath Ratna Puratchi Thalaivar Dr M.G.R. Government Arts and Science College, Palacode – 636808, Dharmapuri District, Tamil Nadu, India.*

[2]Guest Lecturer, Department of Botany, Thiru Kolanjiappar Government Arts College, Virudhachalam – 606001, Cuddalore District, Tamil Nadu, India.

[*]Correspondance Email Id: drkgandhimaniyan@gmail.com

The marine algae are one of the most important marine resources in the world and widely used as human food, animal feed and raw material for many industries. They improve seeds germination, seedlings development, increase plant tolerance to environmental stresses, enhance plant growth and yield. Seaweed extracts act as bio-stimulants mainly due to the presence of plant hormone. Main phytohormones identified in seaweed extracts are: auxin, cytokinin, gibberelin, abscisic acid and ethylene. Recent researches proved that seaweed fertilizers are better than other fertilizers since they are very economic and eco friendly. Seaweed can be regarded as a potential source of biochemical constituents like carbohydrates, lipids, proteins, fibers, ash, phenol, dietary fiber etc in plant. The seaweed also good source of micro & macro elements required for plant nutrition. Seaweed extract is effective for improves the quality of produce and soil conditioner. Current study to ensure effect of seaweed liquid fertilizer on plant growth of *Capsicum annum* L. Pretreated seeds sowed in Germination Tray and Field condition. Concentrations used to treat were 20%, 40%, 60%, 80%, 100% and compared with control, foliar spray. Irrigation was done at day interval. Vegetative and Biochemical parameters were analyzed on day 45. These comparative results were shown that the Capsicum annum has maximum vegetative and biochemical yield when treated with 20% and followed by 40% seaweed liquid biofertilizer and lowest yield in 100% treatment. So, 20% concentration of is proved better for *Capsicum annum* L.

Keywords: Seaweed, SLF, Growth parameters, yield

STUDIES ON THE ANTIMICROBIAL ACTIVITY OF *PIPER LONGUM* EXTRACT

SUBRAMANIAN MANIMARAN[1]* & GANDHIMANIYAN KRISHNAN[2]

[1]Guest Lecturer, Department of Botany, Thiru Kolanjiappar Government Arts College, Virudhachalam – 606001, Cuddalore District, Tamil Nadu, India.*

[2]Guest Lecturer, Department of Microbiology, Bharath Ratna Puratchi Thalaivar Dr M.G.R. Government Arts and Science College, Palacode – 636808, Dharmapuri District, Tamil Nadu, India.

[*]Correspondance Email Id: subbuplantbiotech@gmail.com

In recent years, natural herbal agents have emerged as promising alternatives to synthetic irrigants, garnering attention for their inherent antibacterial, anti inflammatory, antioxidant, and antifungal properties. Studies suggest that herbal irrigants may offer favorable outcomes in preserving dentin properties, including maintaining surface roughness, micro hardness, and minimizing erosion. This trend reflects a growing interest in sustainable and biocompatible agents that align with the ongoing shift toward natural and patient-friendly dental products. One promising candidate in this area is *Piper longum*, commonly known as Long Indian Pepper or Pippali. *Piper longum* belongs to the Piperaceae family and is widely cultivated across the Indo-Malaysian region for its dried fruit, traditionally used as both a spice and a medicinal agent. The nutritional profile of *Piper longum* also includes key minerals such as calcium, phosphorus, and iron, which enhance its therapeutic potential. In the current study antimicrobial activity extract of *Piper longum* in discovered invitro against bacteria and fungi. The bacterial strains are *Pseudomonas aeruginos* and *E.coli*. The fungal strains are *Aspergillus flavus* and *Trycophyton rubrum*. Finally the result observed the highest antimicrobial activity found in *Pseudomonas aeruginos* and minimum value found in *E.coli*. The highest antifungal activity observed the highest value in *Aspergillus flavus* and minimum value found in *Trycophyton rubrum*.

Keywords: Antibacterial, Antifungal, *Piper longum*, nutritional profile

DETERMINATION OF HARMFUL METALS IN WATER, SEDIMENTS AND FISH FROM VELLAR RIVER, TAMIL NADU, INDIA

G AMBEDKAR[1*] & M MUNIYAN[2]

[1]*Department of Zoology, Sacred Heart Arts and Science College, Perani, Villupuram, Tamil Nadu, India.*

[2]*Department of Zoology, Periyar Arts College, Cuddalore, Tamil Nadu, India.*

*****Corresponding author: gambedkar1984@gmail.com

The present work deals with the metal analysis in water, sediment and selected freshwater fish in the Vellar river collected from January to December 2011. The distribution of metal concentration observed in the water and sediment samples was in the order of Cd > Cu >Pb> Cr > Fe > Zn >Mn, of which the levels of Cd 1.68 ± 0.076 mg/l was the highest and Mn 0.04 ± 0.002 mg/l was the lowest that were recorded in the water sample of the selected Vellar river water. The highest concentration levels of Cd 1.70 ± 0.068 mg/kg and the least concentration of Mn 0.20 ± 0.008 mg/kg were recorded in its sediment samples. The metal concentration distribution in the selected fish organ samples examined was in the order of Cd > Cu >Pb> Cr > Fe > Zn and Mn in liver > gill > kidney > intestine > muscle. The highest concentration levels of Cd 1.78 ± 0.053 mg/kg dry weight and the least concentration levels of Mn 0.04 ± 0.002 mg/kg dry weight were observed in the liver tissue of *Mugil cephalus*. The distribution of metal concentration was found to be in the order of magnitude as *Mugil cephalus* > *Heteropneustes fossilis* > *Mystus vittatus* > *Etroplus suratensis* > *Anabas testudineus*. Rise in agricultural, domestic and anthropogenic wastes in the investigated area might be the reason behind such increased accumulation of metal levels in these five fishes.

Keywords: Heavy metals, Sediment, Freshwater fish, Vellar river, Anthropogenic activities

VOLCANIC ASH AS REUSABLE CATALYST IN THE GREEN SYNTHESIS OF XANTHENE DERIVATIVES

P. GNANAVALLI & A. KURUTHEERTA KUMARAN

Department of Chemistry, Thiru Kolanjiappar Government Arts College, Virudhachalam

An efficient and environmentally adapted synthesis of Xanthene derivatives by condensation of a wide range of aryl aldehydes and 1,3-cyclohexanediones in microwave

using a volcanic ash as reusable catalyst. The catalyst was characterized by XRD, SEM, EDS and FT-IR. The synthesised Xanthene derivatives are characterized by IR, ^{1}H and ^{13}C NMR spectra. Xanthene derivatives are demonstrating a wide range of pharmacological activity.

Keywords: Xanthene derivatives, XRD, SEM, EDS, FTIR, ^{1}H and ^{13}C NMR

SYNTHESIS, CHARACTERIZATION, AND IN VITRO ANTIMICROBIAL EFFICACY OF ZnO, Mn/ZnO, AND BI-Mn/ZnO NANOPARTICLES AGAINST BACTERIAL AND FUNGAL PATHOGENS

V. SURESH & Dr. G. BOOBALAN

Department of Chemistry, Sri Vinayaga College of Arts & Science, Ulundurpet, Tamil Nadu.

Bi–Mn co-doped ZnO nanomaterials were synthesized via a simple precipitation method and systematically characterized to investigate their structural, morphological, and antimicrobial properties. X-ray diffraction (XRD) analysis confirmed that ZnO retained its hexagonal wurtzite structure, with successful incorporation of Bi and Mn ions and no secondary phases. Fourier-transform infrared (FT-IR) spectroscopy was used to identify the characteristic functional groups and chemical bonding, confirming the presence of Zn–O vibrations and successful doping. Transmission electron microscopy (TEM) revealed uniformly distributed nanosized particles with well-defined morphology. The antimicrobial activity of Bi–Mn/ZnO was evaluated against five human pathogens, including Gram-negative bacteria (*E. coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*), Gram-positive bacteria (*Streptococcus pneumoniae*), and the fungal pathogen (*Candida albicans*), using the well diffusion method. The co-doped nanoparticles exhibited significantly higher inhibition zones compared to undoped ZnO, demonstrating broad-spectrum antimicrobial efficacy. The enhanced activity is attributed to the synergistic effect of Bi and Mn co-doping, which promotes reactive oxygen species (ROS) generation and disrupts microbial cell membranes. These findings indicate that Bi–Mn co-doped ZnO nanomaterials are promising candidates for antibacterial and antifungal applications.

Ni-O-C/LNSP CORE-SHELL HETEROSTRUCTURE MIMICKING NOBLE METAL-LIKE ACTIVITY AND NON-ENZYMATIC ELECTROCHEMICAL LACTATE REGULATION IN HUMAN SWEAT

KALIYAMOORTHYSANTHOSH KUMAR, DHANASINGHTHIRUVENGADAM, AROKIADOSSDAVIDRICHETSON, MURUGANVIJAYARANGAN, JAYARAMAN JAYABHARATHI* AND MANOHARAN PADMAVATHY

Department of Chemistry, Materials science lab, Annamalai University, Annamalai nagar, Tamil Nadu 608002, India.

**jtchalam2005@yahoo.co.in*

Herein, core/shell LNSP (lamellar nanosheet-nanoplate) of nickel oxy carbide (Ni-O-C/LNSP) have been synthesized by solvent-devoid combustion process whichexhibit exceptional OER performance with low overpotential (311 mV), small Tafel slope (116 mV dec^{-1}) and excellent stability (8h; 2.8% potential loss)owing to high conductivity, more exposed active sites and interface effect. The activation energy of 28 kJ/mol was calculated for electrolysis using Ni-O-C/LNSP. The calculated integrated area of 3.70 x 10^{-5} AV (Ni-O-C/LNSP) confirmed MOOH* formation and the corresponding number of active sites are found to be 4.619 $\times 10^{-16}$. Ultrastability of Ni-O-C/LNSPfor industrial application was confirmed by durability at 10/100 mA cm^{-2} for OER (GC-8 h, 2.8%/-; NF-100h, 3.4% /4.9%), UOR (60h/3.4%), SWO (60h /4.1%) MSWO (60h/5.6%) and overall water splitting (100h, 3.9%). Effect of pH and addition of tetramethylammonium cation (TMA^+) reveals Ni-O-C/LNSPfollows lattice oxygen mechanism (LOM).The display of solar-driven water electrolysis at 1.58 V shows the effectiveness of an electrocatalyst for STH conversion. The multi applications of Ni-O-C/LNSP proposed to be an auspicious catalyst for fuel cell applications.Using Ni-O-C/LNSP, we have produced H_2effectively with less power consumption of 771.08 L_{H2} kW h^{-1} than bare NiO (801 L_{H2} kW h^{-1}). The as prepared Ni-O-C/LNSP used for non-enzymatic lactate detection, showed sensitivity of 71.05 μA mM^{-1} cm^{-2} at 1.54 V and the lactate concentration difference in the human sweat wascorroborated under both anaerobic and aerobic exercise conditions using Ni-O-C/LNSP.

Keywords: Ni-O-C/LNSP, core/shell, high intrinsic activity, superaerophobicity, power consumption, activation energy, OER performance

About the Institution

Sri Vinayaga College of Arts & Science is a co-educational, which is established by Vinayaga Educational and Scocial Welfare Trust at Ulundurpet under the Tamil Nadu Government G.O No. 184/dated 28.06.2006 in the academic year 2006-07, currently affiliated to Annamalai University, Chidambaram. At present the college has 11 departments in all disciplines ranging from fundamental science, arts, humanities, commerce, social science, life sciences, computer and management studies and aspires to create research and development wing in all faculties in future. The college is credited by the secretary Prof. V. Ganesan has rich experience over two decades in the field of higher education. The college has most dedicated, qualified and experienced faculties.

About the Department

The Departments of Biotechnology, Chemistry & Physics offers comprehensive undergraduate, postgraduate and Ph.D programs focused on the study of living organisms, biological systems, and advanced technologies. Department is equipped with well furnished laboratories with advanced equipments for life science studies. Departments provides hands-on learning opportunities in various biological fields, fostering research curiosity and developing highly skilled professionals under guidance of qualified faculty.

About the Conference

The International Conference on Emerging Trends in Applied Sciences (ETAS-26) will be held at Sri Vinayaga College of Arts & Science, Ulundurpet during 27th February 2026. The conference aims to bring together researchers, academicians, industry experts, and policymakers to discuss recent advances, challenges, and future prospects in metagenomics-guided bio-electrokinetic remediation. Through knowledge exchange and collaborative dialogue, this platform seeks to contribute towards the development of sustainable strategies for rehabilitating affected environments and protecting health for future generations. Also the topic covers advances in other field of basic sciences, green energy and natural products.

Registration fee

Registration Details (Includes Conference kit, Lunch & Refreshment)

Students	: Rs 250 /-
Factulty /Research Scholar	: Rs 300 /-
Others	: Rs 400 /-

Registration Deadline : 24.02.2026

Registration link

https://forms.gle/LYVT1u91sQec8o1g9

Online Payment

Interested researchers may submit a soft copy of their abstracts for oral or poster presentations to svcbt06@gmail.com

Further information - Dr. A. SABARIDASAN - 7904915282, 9865334360

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Cordially invities you to grace the occassion

In connection with Science Day celebrations

International Conference on "Emerging Trends in Applied Sciences"

Time : 10.00 A.M.

27th February 2026 Venue : Auditorium

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Dr. ARULPRAKASH ARUMUGAM
Department of Mechanical Engineering
School of Material Science
Shandong University of Technology
Zhangdian District, Zibo City
China - 255000

Dr. P. SATHISHKUMAR, M.Sc., Ph.D.
Assistant Professor (Senior Grade)
Department of Chemistry
Vellore Institute of Technology (VIT)
Vellore - 632014, Tamil Nadu, INDIA

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Assistant Professor of Physics

STUDENT VOLUNTERS

Biotechnology, Chemistry & Physics

PROGRAMME SCHEDULE

9.30 - 10.00AM	: Registration
10.00 - 10.15AM	: Lighting the Kuthu Vilakku & Tamil Thaai Vaazhthu
Welcome Address	: Dr. A. SABARIDASAN, Head & Assistant Professor of Biotechnology
Inaugural Address	: Dr. R. KUMARESAN, Principal
Felicitation Address	: Dr. V. GANESAN, Secretary
11. 00AM	: High Tea
11.15 - 12.00PM	: Invited Talks 1 Dr. ARULPRAKASH ARUMUGAM Title " Metagenomic analysis of microbial community and its role in bio-electrokinetic remediation of tannery contaminated soil"
12.05PM - 12.45PM	: Invited Talks 2 Dr. P. SATHISHKUMAR Title "Multifrequency sono-photocatalyis - A sustainable tool for the environmental remediation"
12.45 - 1.15PM	: Lunch Break
1.30PM	: Poster & Oral Presentation
3.15PM	: Valedictory Address Dr. P. SATHISHKUMAR
3.30PM	: Vote of Thanks Dr. G. BOOBALAN Head & Assistant Professor of Chemistry

National Anthem

International Conference on "Emerging Trends in Applied Sciences" (ETAS - 26)

Time : 10.00 A.M.

Venue : Auditorium

27th February 2026

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PG & Research Departments of Biotechnology, Chemistry & Physics