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**St. JOSEPH'S COLLEGE OF ENGINEERING**  
(An Autonomous Institution)  
**St. Joseph's Group of Institutions**  
OMR, CHENNAI - 119



We prepare for

**Cambridge**

English Qualifications



# DEPARTMENT OF BIOTECHNOLOGY

# NEWSLETTER

## About Us

**September 2025**

The Biotechnology Department was incepted in the year 2002 and Accredited by NBA.

Having a state-of-art laboratory, the department offers both Bachelors and Ph.D courses which are affiliated with Anna University, Chennai

## Vision

To provide a world-class department to facilitate learning, training and research in Biotechnology by providing infrastructural facilities and competent faculty leading to technological innovations to serve the global society

## Mission

The Mission of the Department is to provide quality education to students and to produce competent Biotechnologists to meet the challenges faced by industry and mankind.

To inculcate high moral and professional standards among our students.

To develop the overall personality of the students.

# STUDENT ACHIEVEMENTS

## MAKE-A-THON

Our Biotechnology students (2 teams) for securing winning positions with Rs. 5000 cash prize in “SIH 2025 (Internal Edition) Make-a-thon 2.0”, conducted on 11.09.2025 & 12.09.2025. under the supervision of **Dr. G. Baskar, Ms. Anli Dino and Ms. Sridevi**



# STUDENT ACHIEVEMENTS

## Sports Winner

Our final year student **Sushma R** along with her teammates as won 1<sup>st</sup> place in Badminton, held on 10<sup>th</sup> of September at Anna University.



# STUDENT ACHIEVEMENTS

## Internship

Our final Year student **Jayashri B S** have been selected as Project Trainee at **Zoho** with the stipend amount of **Rs.20000** per month.

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**DEPARTMENT OF BIOTECHNOLOGY**

**CONGRATULATIONS**  
**INTERNSHIP OFFER**

**STIPEND:**  
**RS. 20,000/ MONTH**  
**FOR 6 MONTHS**

**JAYASHRI B S**

**BATCH 2022-2026**

**ZOHO - TECHNICAL SUPPORT ENGINEER**

**LOCATION: ZOHO, ESTANCIA IT PARK, GST ROAD, CHENNAI**

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# Alumni Meet

The Department of Biotechnology at St. Joseph's College of Engineering organized its Alumni Meet on **13<sup>th</sup> September.**



## DEPARTMENT OF BIOTECHNOLOGY

### Glimpses of Alumni Meet



# Mock Interview

A mock interview session was conducted on **13th September** by the **Department of Biotechnology**, exclusively for the **3rd and 4th year Biotechnology students**. The event was organized with the valuable support of our **distinguished alumni**, who guided students through real-time interview experiences.



# Value Added Course

The Department of Biotechnology, St. Joseph's College of Engineering, organized Value-Added Courses on *Advancement in Drug Designing* for the 3rd and 4th year Biotechnology students. The sessions were conducted by Biozone Solutions Pvt. Ltd., offering hands-on training and expert insights into modern drug discovery approaches.



# Teacher's Day Celebration

The Biotechnology Department celebrated Teachers' Day on **September 4<sup>th</sup>** with great enthusiasm and creativity. Students showcased their talents through captivating performances, including singing and dancing, making the event lively.





# Prize Winners

Our final year and third students have participated in **National Level Symposium FEAST 2025** and won **1<sup>st</sup> prize in Innova Dish** held on **23<sup>rd</sup> September** at **SRM Institute of Science and Technology**



# Internal Audit

An internal academic audit was conducted in the Department of Biotechnology on 26th September 2025 by **Dr. P. Gomathi Priya** and **Dr. S. Karthick Raja**. The audit reviewed academic processes and provided valuable suggestions for further enhancement.



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**DEPARTMENT OF BIOTECHNOLOGY**



## Academic Audit (2025-2026)



**Dr. P. Gomathi Priya**  
Professor  
Department of Chemical Engineering  
A C Tech, Anna University  
Chennai – 600025

**Dr. S. Karthick Raja**  
Professor  
SIMATS School of Engineering,  
Chennai



**Biotech Lab**



**26/09/2025**



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# Workshop

A one-day hands-on training on **Atomic Absorption Spectrophotometer (AAS)**, supported by **DST-FIST**, was organized in the Department of Biotechnology on **26th September 2025**. The workshop included demonstrations, technical discussions, and practical sessions on sample preparation, analysis, and data interpretation.



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**DST-FIST SUPPORTED**  
**ONE DAY HANDS-ON TRAINING**  
ON  
**ATOMIC ABSORPTION**  
**SPECTROPHOTOMETER**  
**26th September 2025**

**HIGHLIGHTS OF THE WORKSHOP**

- Introduction to AAS and its applications
- Live demonstration of sample preparation and analysis
- Instrument handling and data interpretation
- Technical discussions & interaction with experts
- Certificate of Participation

**WHO CAN PARTICIPATE?**

UG/PG students, Ph.D. scholars, faculty members and professionals from research organization  
Limited to 30 participants

**REGISTRATION FEE: Rs.150**

Last date for Registration: 18th September 2025

Intimation of acceptance: 20th September 9025

**Registration Link:** <https://forms.gle/UbsMoynuvjimGjq8>



# STAFF ACHIEVEMENTS

## Certificate of Excellence

**Dr. LFA Anand Raj** has received certificate of excellence in reviewing from Journal of Advances in Biology and Biotechnology



# STAFF ACHIEVEMENTS

## Best Teacher Award

**Dr. G. Baskar** has been awarded with the **Best Teacher Award (Engineering) 2025** instituted by The Institution of Engineers (India) – Tamil Nadu State Centre.



# STAFF ACHIEVEMENTS

## Top 2% Scientists In the World

**Dr. G. Baskar** has been recognized among the **Top 2% Scientists in the World**, as listed by **Stanford University** and Elsevier BV



**Gurunathan, Baskar**  
St. Joseph's College of Engineering 

**Rank: 55047**

- ☉ Main Field: Enabling & Strategic Technologies
- ☉ Sub Field: Biotechnology
- ☉ Rank in the SubField: 188.0
- ☉ H-index: 17, Hm-index: 10

Top 2% Listed Year(S): 2025, 2024, 2023, 2022, 2021  
*"Single Year" Data*

 The data is verified and sourced from **ELSEVIER** and **Stanford University's** Top 2% Scientists list.



[www.TopSciNet.com](http://www.TopSciNet.com)

# STAFF ACHIEVEMENTS

## Paper Publication

**Dr. G. Baskar** has published 2 research papers in the **Indian Journal of Biochemistry and Biophysics**, and **Molecular Catalysts**



Indian Journal of Biochemistry & Biophysics  
Vol. 62, October 2025, pp. 1142-1149  
DOI: 10.56042/ijbb.v62i10.7469



### Investigations on novel aedesin-derived peptides against ESKAPE pathogens

Rajamohammed Khader, and Gurunathan Baskar\*

Department of Biotechnology, St. Joseph's College of Engineering, Chennai-600 119, Tamil Nadu, India

Received 21 December 2023; revised 24 June 2025

Antimicrobial peptides (AMPs) are promising alternatives to conventional antibiotics, yet strategies to optimize novel peptide templates remain limited. In this study, *aedesin*, a cecropin-like peptide from *Aedes aegypti*, was investigated and found to adopt a beta-bend-beta structure. Systematic modifications were introduced on the N- or C-terminal helices to enhance antimicrobial efficiency and selectivity. N-terminal derivatives showed greater potency compared to C-terminal modifications. Notably, peptides 2D11 and 2D12 exhibited minimum inhibitory concentrations (MICs) of 8–16  $\mu\text{g/mL}$  against *Acinetobacter baumannii*, while peptide 3E1-E3 displayed broad-spectrum activity against ESKAPE pathogens with MICs of 16–64  $\mu\text{g/mL}$ . Similarly, peptides 4B5-B11 demonstrated MICs of 8–32  $\mu\text{g/mL}$  against most bacteria, excluding *Enterococcus faecium*. Among them, peptide 4B11 showed the strongest activity against methicillin-resistant *Staphylococcus aureus* (MRSA) strain MW2, with an MIC of 8  $\mu\text{g/mL}$ . Cytotoxicity assays confirmed that the peptides were non-toxic to HEPG2 cells at their MICs and to human red blood cells up to 128  $\mu\text{g/mL}$ . Mechanistic studies revealed a membrane-disruptive mode of action, supported by propidium iodide uptake and membrane depolarization assays. Furthermore, peptides effectively eliminated antibiotic-induced persister cells and protected *Galleria mellonella* from MRSA infection. These findings highlight optimized aedesin-derived peptides as potential candidates against ESKAPE pathogens.

**Keywords:** Antimicrobial peptides, *Galleria mellonella*, HEPG2 cell lines, Minimal inhibitory concentration

According to the Infectious Diseases Society of the United States declared in recent years, a group of pathogens has been capable of escaping from the action of currently used antimicrobials. The panel is responsible for causing the most nosocomial infections in humans with increased pathogenesis and virulence that lead to life-threatening infections. Bacteria including, *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter species* are included in the ESKAPE pathogen panel. The Centers for Disease Control and Prevention (CDC) estimates that at least 2 million Americans contract an antibiotic-resistant infection each year, which results in 23, 000 deaths. The mortality rate associated with this condition has already eclipsed the number from HIV infections. Furthermore, the British groups' estimations are far more concerning. As a result, if nothing is done, the toll will increase to 10 million by 2050 at the very least. Furthermore, the system is further confounded by the rate at which these ESKAPE microorganisms acquire resistance to the widely used antibiotics. Due to

the limited rate at which new antibiotic classes are identified, it would be nearly impossible to counteract<sup>1</sup>.

Several studies have consensus to develop antimicrobial peptides (AMPs) as alternatives to antibiotics<sup>2</sup>. These are short peptides less than 50 amino acids and have a broad-spectrum activity. They are produced by nearly all the life kingdoms including: plants, animals, fungi, bacteria, and even archaea as the first line of defense. AMPs are mostly cationic,  $\alpha$ -helical with specific hydrophobic characters, while  $\beta$ ,  $\beta$  peptides rich in specific amino acids are less numerically reported<sup>3</sup>. A balance in the charge and the hydrophobicity renders an amphipathic structure required for the AMPs to bind the negatively charged bacterial membranes<sup>4</sup>. This property edges the selectivity over its mammalian cell to its zwitterionic properties imparted by the presence of cholesterol moieties. Although non-membrane targets of the AMPs are also well known as proline-rich AMPs work by inhibiting protein synthesis in *E. coli* and defensins like Human  $\beta$ -Defensin 3 inhibit cell wall biosynthesis in *S. aureus*<sup>5</sup>. However, most AMPs have short killing times because of their membrane-interacting nature. The property doesn't give sufficient selection pressure for the development

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journal homepage: [www.journals.elsevier.com/molecular-catalysis](http://www.journals.elsevier.com/molecular-catalysis)



### Research Paper

### Mango leaves-derived carbonaceous material as a green catalyst for biodiesel synthesis from *Jatropha curcas* oil

Kankana Saikia<sup>a</sup>, Sayali Prakash Jamadar<sup>a</sup>, Hu Li<sup>b</sup>, Baskar Gurunathan<sup>c,d,\*</sup>, Gopinath Halder<sup>a</sup>, Monjuly Rongpiti<sup>a</sup>, Samuel Lalhazuala Rokhum<sup>c,d</sup>

<sup>a</sup> Department of Chemistry, National Institute of Technology Silchar, Silchar 788010, Assam, India

<sup>b</sup> State-Louis Joint Laboratory for Comprehensive Utilization of Biomass, Center for R&D of Fine Chemicals, Ouhuang University, Ouhuang 550025, China

<sup>c</sup> Department of Biotechnology, St. Joseph's College of Engineering, Chennai 600119, India

<sup>d</sup> KIST-KEIT Graduate School of Converging Science and Technology, Korea University, Seoul 02841, the Republic of Korea

<sup>e</sup> Department of Chemical Engineering, National Institute of Technology Durgapur, Durgapur, West Bengal 713209, India

### ARTICLE INFO

**Keywords:**  
Waste mango leaves  
Biodiesel  
Transesterification  
Cost analysis  
Sulfonation  
Carbonaceous material  
*Jatropha curcas* oil

### ABSTRACT

Growing concerns over fossil fuel depletion and environmental impact have intensified the search for sustainable biofuels such as biodiesel. To address the drawbacks of homogeneous catalysts, a novel heterogeneous catalyst (MLCM-18-S) was developed via hydrothermal carbonization of mango leaf powder followed by sulfonation. This carbonaceous catalyst was employed for biodiesel production from non-edible *Jatropha curcas* oil. Under optimized conditions (methanol to oil ratio 21:1, 90 °C, 7.5 wt. % catalyst, 56 min of microwave irradiation), a high yield of 95.1 % biodiesel was achieved. The catalyst was thoroughly characterized using FTIR, XRD, SEM, BET and TGA, while the biodiesel was analysed by FTIR, NMR, and GC-MS. TGA demonstrated improved stability after hydrothermal treatment of mango leaf (weight loss reduced from 54.5 % to 40.2 % up to 470 °C), while the sulfonated catalyst (MLCM-18-S) showed only 7.0 % loss of -SO<sub>3</sub>H groups below 180 °C, confirming structural integrity under biodiesel reaction conditions. BET analysis confirmed the structural evolution from raw mango leaves (0.62 m<sup>2</sup> g<sup>-1</sup>, 0.001 cc g<sup>-1</sup>), to a porous hydrochar (5.16 m<sup>2</sup> g<sup>-1</sup>, 0.010 cc g<sup>-1</sup>), while sulfonation yielded a micro-mesoporous catalyst (MLCM-18-S) with hierarchical pores (~1.8–16 nm) and abundant -SO<sub>3</sub>H groups. Kinetic studies revealed pseudo first order behavior with an activation energy of 16.53 kJ mol<sup>-1</sup>. The catalyst exhibited excellent stability, retaining high activity up to the 5th reuse cycle. This study highlights the effectiveness of sustainable biomass derived catalysts for efficient and economically viable biodiesel production.

### 1. Introduction

The multiplicative expansion of the human population globally associated with the sufficient living standards has given rise to in an exponential escalation in energy requirements. Currently, the major part of this energy is consumed by the movement of goods and services, which plays a key role in driving the global economy. It predominantly depends on non-replenishable fossil energy sources. In total primary energy consumption, the energy derived from petroleum resources is about 90 % of the overall total primary energy consumption. Amongst these, energy consumption done by the transportation sector is 54 % [1]. The natural formation of fossil fuels takes millions of years, and the increasing demand for energy has driven researchers to seek out a viable, ecofriendly, and sustainable alternative fuel. Consequently,

biodiesel has grabbed attention worldwide and replaced fossil fuel to some extent. Biodiesel is renewable, biodegradable, nontoxic, carbon neutral and it comes with high combustion efficiency as well as low CO<sub>2</sub> emission. Without much modification, a diesel engine can successfully run on biodiesel [2,3]. The main process used for biodiesel production is transesterification. These reactions involve various edible and non-edible oil feedstocks. In transesterification, homogeneous, heterogeneous, and enzymatic catalysts are used where the glycerol group of triacylglycerol (TAG) is reacted with an alcohol of short chain [1].

The diverse availability of feedstocks constitutes a major advantage for biodiesel production, supporting its role as a promising alternative to fossil fuels [1]. Among the various options, non-edible oils are often preferred over edible oils because they circumvent competition with food resources, lower production costs, and offer better sustainability

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<https://doi.org/10.1016/j.mcat.2025.115499>

# STAFF ACHIEVEMENTS

## Faculty Development Program

**Dr. G. Baskar** has attended one week FDP program on  
“**Embedding SDGs in Higher Education Curricula**”  
conducted by **SRM University** from August 18<sup>th</sup> to 22<sup>nd</sup>



### CERTIFICATE OF COMPLETION

This is to certify that

Dr/Mr/Ms **Baskar Gurunathan**  
from **St. Joseph's College of Engineering, Chennai**

has successfully completed in the **Faculty Development Program (FDP)** on  
“**Embedding SDGs in Higher Education Curricula**” organised by **SDG Cell,**  
**Office of the Dean-QAR, SRM University-AP** from August 18 - 22, 2025.

  
**Dr Prateek Gupta**  
Coordinator  
SDG Cell

  
**Dr Karthik Rajendran**  
Associate Dean  
Quality Assurance and Rankings

# STAFF ACHIEVEMENTS

## Patent Publication

**Dr. S. Justin Packia Jacob** has published a patent entitled **“Spiruloglow A Probiotic Bead Based Gel Formulation For Skincare Comprising Probiotic Beads And Natural Plant Extracts”**



Office of the Controller General of Patents, Designs & Trade Marks  
Department for Promotion of Industry and Internal Trade  
Ministry of Commerce & Industry,  
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

| Application Details              |                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| APPLICATION NUMBER               | 202541076044                                                                                                          |
| APPLICATION TYPE                 | ORDINARY APPLICATION                                                                                                  |
| DATE OF FILING                   | 11/08/2025                                                                                                            |
| APPLICANT NAME                   | 1 . ADVIKA J<br>2 . CHRISTINA R LEO<br>3 . Dr. S. JUSTIN PACKIA JACOB                                                 |
| TITLE OF INVENTION               | SPIRULOGLOW A PROBIOTIC BEAD BASED GEL FORMULATION FOR SKINCARE COMPRISING PROBIOTIC BEADS AND NATURAL PLANT EXTRACTS |
| FIELD OF INVENTION               | CHEMICAL                                                                                                              |
| E-MAIL (As Per Record)           | drjpcob@gmail.com                                                                                                     |
| ADDITIONAL-EMAIL (As Per Record) |                                                                                                                       |
| E-MAIL (UPDATED Online)          |                                                                                                                       |
| PRIORITY DATE                    |                                                                                                                       |
| REQUEST FOR EXAMINATION DATE     | 11/08/2025                                                                                                            |
| PUBLICATION DATE (U/S 11A)       | 29/08/2025                                                                                                            |

# STAFF ACHIEVEMENTS

## NPTEL Certification

**Dr. M. Chamundeeswari**, Associate Professor, Department of Biotechnology, has successfully completed the **NPTEL** course on **Proteins and Gel-based Proteomics (July–August 2025)** and has been awarded a **Silver Medal**

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**DEPARTMENT OF BIOTECHNOLOGY**  
**Congratulates**

**NPTEL**  
NATIONAL PROGRAM ON TECHNOLOGY  
ENHANCED LEARNING LOCAL CHAPTER

**Dr. M. Chamundeeswari**  
Associate Professor,  
Biotechnology  
Course on Proteins and Gel-based Proteomics  
(July- August 2025)

**NPTEL ONLINE CERTIFICATION**  
The certified candidate has successfully completed the course  
Proteins and Gel-based Proteomics  
with a certified score of 76 %  
Online Performance : 60 marks | Practical Exam : 16 marks  
Total number of questions certified in this course : 144  
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# STAFF ACHIEVEMENTS

## Faculty Development Program

**Dr. M. Chamundeeswari**, has attended one week FDP program on **“Innovative Teaching Learning”** conducted by NITTTR and e-FDP on **“AI Powered Future of Pharmacy”** at GRT Institute of Pharmaceutical Education and Research



# STAFF ACHIEVEMENTS

## Reviewer Certificate

**Dr. M. Chamundeeswari**, has received certificate of reviewing from Journal of **Ceramics International** for her contribution to that journal



# STAFF ACHIEVEMENTS

## Webinar

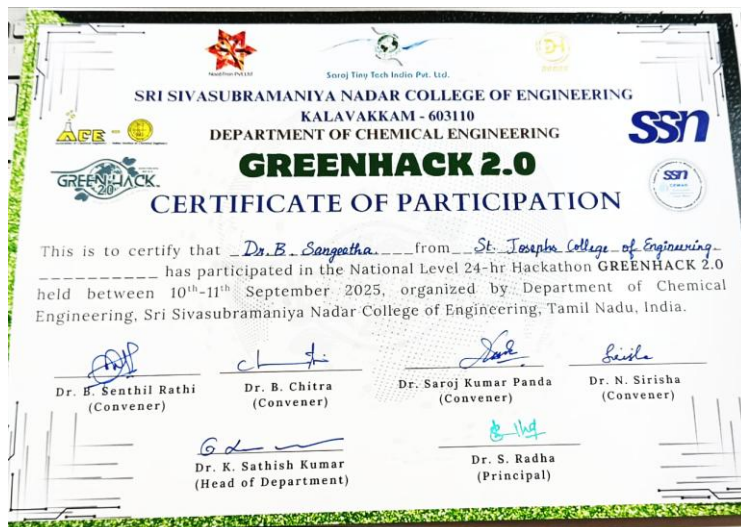
**Dr. B. Sangeetha, Ms. A. Anli Dino and Ms. Mu. Poornimaa**, have participated in a Webinar during **06.09.25** organised by **Global Faculty Industrialist-Researcher Community**



# STAFF ACHIEVEMENTS

## Green Hack 2.0

**Dr. B. Sangeetha** and **Ms. A. Anli Dino** have participated in Green Hack 2.0 held on 10<sup>th</sup> and 11<sup>th</sup> September at SSN



# STAFF ACHIEVEMENTS

## FOODATHON

**Dr. B. Sangeetha, Ms. A. Anli Dino and Ms. R. Sridevi** have participated in **National Level Symposium FEAST 2025** and won **1<sup>st</sup> prize** in **Innova Dish** held on **23<sup>rd</sup> September** at **SRM Institute of Science and Technology**





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# DEPARTMENT OF BIOTECHNOLOGY

**September 2025**

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**Dr. B. Babu Manoharan, M.A., M.B.A., Ph.D.**  
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Dean-Student  
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Department of Biotechnology

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