

**GRAPHENE OXIDE RE-INFORCED SILK FIBROIN FILM FOR
SUPERCAPACITOR APPLICATIONS**

A PROJECT REPORT SUBMITTED TO

KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

INDIAN INSTITUTE OF SCIENCE CAMPUS, BENGALURU

UNDER STUDENT PROJECT PROGRAMME

(SPP - 46th SERIES: 2022-23)

PROJECT REFERENCE NO: 46S_MSc_079

PROJECT STUDENTS

G PAVAN KUMAR (P18EB21S0018)

LISHA S (P18EB21S0007)

BRUNDA R (P18EB21S0013)

BHOOMIKA B (P18EB21S0059)

PROJECT GUIDE

Dr. SHIVANANDA C S

ASSISTANT PROFESSOR & PG CO-ORDINATOR

DEPARTMENT OF PHYSICS

KLE SOCIETY'S S NJALINGAPPA COLLEGE

II BLOCK, RAJAJINAGAR

BENGALURU - 560010

AUGUST 2023

KLE Society's



S. NIJALINGAPPA COLLEGE

II Block, Rajajinagar, Bengaluru - 560 010.

Permanently Affiliated to Bengaluru City University, Bengaluru
Re-accredited by NAAC at A+ Level with 3.53 CGPA with 3rd Cycle
Phone : 080 - 2332 5020, 2352 6055
Website : www.klesnc.org | Email : info@klesnc.org.



Ref. No. : KLESNC/2022-23

Date : 22/08/2023

CERTIFICATE FROM THE HEAD OF INSTITUTION

This is to certify that the project report titled "Graphene Oxide Reinforced Silk Fibroin Film for Supercapacitor Applications" (Project reference No. 46S_MSc_079) was submitted by G PAVAN KUMAR (P18EB21S0018), LISHA S (P18EB21S0007), BRUNDA R (P18EB21S0013) and BHOOMIKA B (P18EB21S0059) to the Karnataka State Council for Science and Technology (KSCST – 46th Series Student Project Programme) for the completion of the research work they carried out in the Department of Physics at KLE Society's S Nijalingappa College under the guidance of Dr. Shivananda C S Assistant Professor & PG Coordinator, KLE Society's S Nijalingappa College. Additionally, I attest that this project report was not previously produced for the purpose of awarding any degree, diploma, or associateship from another University or Institution.


PRINCIPAL
Principal

K.L.E Society's S. Nijalingappa College
II Block, Rajajinagar, Bangalore-560 010

Place: KLE Society's S Nijalingappa College

Date: Bengaluru

CERTIFICATE FROM THE PROJECT GUIDE

This is to certify that the project report titled "**Graphene Oxide Reinforced Silk Fibroin Film for Supercapacitor Applications**" (Project reference No. 46S_MSc_079) was submitted by **G PAVAN KUMAR (P18EB21S0018), LISHA S (P18EB21S0007), BRUINDA R (P18EB21S0013) and BHOOMIKA B (P18EB21S0059)** to the **Karnataka State Council for Science and Technology (KSCST – 46th Series Student Project Programme)** for the completion of the research work they carried out in the Department of Physics at KLE Society's S Nijalingappa College under my guidance and direct supervision. Additionally, I attest that this project report was not previously produced for the purpose of awarding any degree, diploma, or associateship from another University or Institution.


SHIVANANDA C S
Co-ordinator

Post-Graduate Studies in Physics
K.L.E. Society's S. Nijalingappa College
II Block, Rajajinagar, Bengaluru-560 010

Place: KLE Society's S Nijalingappa College

Date: Bengaluru

DECLARATION BY CANDIDATES

We therefore declare that the information contained in the project "**Graphene Oxide Reinforced Silk Fibroin Film for Supercapacitor Applications**" is the outcome of research we conducted at the Physics Department at S Nijalingappa College, Bengaluru. Under the supervision of Dr. Shivananda C S, the Physics Department of S Nijalingappa College of the KLE Society, Bengaluru, and the same has not previously been formed for the award of any degree or diploma. In keeping with the standard procedure for presenting scientific observations, appropriate acknowledgement is given whenever the work presented is based on the results of other researchers. However, mistakes and oversights, if any, are regrettable and inadvertent.

G PAVAN KUMAR Pavan Kumar G
LISH S Lisha S
BRUNDA R Brunda R
BHOO MIKA B B. Bhoomika

Place: KLE Society's S Nijalingappa College

Date: Bengaluru

Acknowledgement

Foremost, we thankful to God for endowing me with health, patience and knowledge to complete this project work. First, we would like to express our sincere gratitude and appreciation to my guide Dr. Shivananda C S, Assistant Professor & PG Coordinator, Department of Physics KLE Society's S Nijalingappa College, for his support and encouragement, for his constant guidance throughout our project work, which have helped us to achieve this work and improve our technical abilities, and for being a wonderful professor. Also, we would like to thank him for giving us an opportunity to pursue research skill and making an original contribution to science.

We sincerely thank Karnataka State Council for Science and Technology, Government of Karnataka, for providing a grants for the research project entitled "**Graphene Oxide Reinforced Silk Fibroin Film for Supercapacitor Applications**" (Project Proposal Reference No. 46S_MSc_079 Dated: 24/08/2023).

We grateful and thankful to **Dr. Arunkumar B Sonappanavar**, The Principal, KLE Society's S Nijalingappa College, for his constant support and encouragement.

We thankful to **Prof. Rajkumar M Badiger**, Head, Department of Physics, KLE Society's S Nijalingappa College for providing department facilities.

We express a deep sense of gratitude and thanks to our teachers **Dr. Latha Rani N & Dr. Ganesh Shridhar Hegde** for their constant support and valuable suggestions for the successful completion of our research work.

During the course of investigation, we have been fortunate to meet many wonderful people who have helped us directly and indirectly. Though it is impossible to name all, we acknowledge their help with utmost gratitude.

G PAVAN KUMAR

LISHA S

BRUNDA R

BHOOMIKA B



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Ref. No. : KLESNC/2022-23/

Date : 22/08/2023

FORM GFR 19-A

UTILIZATION CERTIFICATE

KSCST : STUDENT PROJECT PROGRAMME – 46th SERIES

Sl. No.	Letter No. and date	Amount (Rs.)	
	Ref: 7.1.01/SPP/33 24 th April, 2023	8,000/-	Certified that KSCST has provided partial financial support of Rs. 8,000/- towards Student Project Programme - 46 th Series A sum of Rs 8,000/- only has been utilized for the purpose of Student Project Programme for which it was sanctioned.

Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been duly / are being fulfilled and that I have exercised the following check to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of Checks exercised.

01. Cash Book
02. Vouchers

Sl No	Project Proposal Ref. No.	Title of the Project	Department/ Guide	Amount Sanctioned by KSCST	Amount Utilized by the College	Balance if any to be refunded to KSCST
1.	46S_MSc_079	Graphene Oxide Reinforced Silk Fibroin Film for Supercapacitor Applications	Dr Shivananda C S	8,000/-	8,000/-	Nil


Signature of the Principal
with Seal


Signature of the Finance / Accounts Officer
with Seal

Date: 22/08/2023

Place: Bengaluru



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Ref. No. : KLESNO/2022-23


Date : 22/08/2023

UTILISATION CERTIFICATE

KSCST : STUDENT PROJECT PROGRAMME – 46th SERIES

This is to certify that KLE Society's S Nijalingappa College having its office / institution at II Block Rajajinaga Bengaluru – 560010 Karnataka has been granted a sum of Rs. 8000/- (Eight Thousand Rupees Only) has been credited vide NEFT: Ref No AMT TRFD TO ACTS 0000 dated 11/05/2023 to KLE Society Bangalore. Account No. 8418101084983 from Karnataka State Council for Science and Technology (KSCST) vide their Grant sanction letter Ref. No. 7.1.01/SPP/33 dated 24/04/2023 towards 46th Series Student Project Programme (SPP) - Project reference No. 46S_MSc_079. The college has incurred the expenditure of Rs. 8,000/- (Eight thousand rupees only) towards the said project. All the expenditure voucher / invoices are duly accounted by the college and is authenticated by the Principal and Accounts Officer / Finance Officer of our institution. The above information is extracted from the books of accounts and documents produced before us and information and explanations provided to us. We further certify that, we have verified the relevant books of accounts and documents / bills / vouchers and found that the said amount has been utilized for the purposes as laid down by the Karnataka State Council for Science and Technology (KSCST). This certificate is provided by us at the specific request of Karnataka State Council for Science and Technology (KSCST) to evidence the utilization of grants in terms of above referred grant sanction letter dated 24th April, 2023.


Signature of the Principal
Principal
K.L.E Society's S. Nijalingappa College
II Block, Rajajinagar, Bangalore-560 010


Signature of the Finance / Accounts Officer
with Seal

Date: 22/08/2023

Place: Bengaluru

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Ref. No. : KLESNC/2022-23 |

Date : 22/08/2023

To,

Dr. U T Vijay

Executive Secretary

Chief Scientific Officer

Karnataka State Council for Science & Technology

Indian Institute of Science Campus

Bengaluru - 560012

Respected Sir,

Subject: Submission of Accounts Pertaining to UC of KSCST-SPP 46th Series reg.

Ref No: 1) 7.1.01/SPP/33 Dated 24th April, 2023.

2) Project Proposal Reference No: 46S_MSc_079.

With reference to the above subject, we would like to inform you that, we have been submitted Utilization Certificate and statement of expiditure against released grant along with detailed project report of the research work done under **Karanataka State Council for Science & Technology (KSCST) – 46th Series Student Project Programme.**

Thanking you

J. L. Vananda es
Project Guide
Co-ordinator


Post-Graduate Studies in Physics
K.L.E. Society's S. Nijalingappa College
II Block, Rajajinagar, Bengaluru-560 010

[Signature]
Principal
Principal

K.L.E Society's S. Nijalingappa College
II Block, Rajajinagar, Bangalore-560 010

**Statement of Expinditure (SE) inaccured towards for the Karnataka State Council for
Science & Technology (KSCST) – Student Project Programme 46th Series.**

Sl. No.	Particulars	Date	Quantity	Price
1.	XRD Facility	24/03/2023	6 Samples	2400.00
2	Distilled Water	20/06/2023	20 Liters	840.00
3	Distilled Water	28/06/2023	10 Liters	420.00
4	Polyvinyl Alchohol (PVA)	07/08/2023	500 g	1156.00
5	Stationaries (A-4 Sheet, OHB Sheet, Color Sheet, Note Book)	14/08/2023	---	384.00
6	XRD Facility	16/08/2023	7 samples	2,800.00
			Total	8,000.00


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Co-ordinator
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Principal
Principal
K.L.E Society's S. Nijalingappa College
II Block, Rajajinagar, Bangalore-560 010

From

25-05-2023

Dr. Shivananda C S
Project Guide
KLE Society's S. Nijalingappa College,
Rajajinagar, Bengaluru – 10

To

The Principal
KLE Society's S. Nijalingappa College
Rajajinagar, Bengaluru – 10

Respected Sir,


Subject: Request to Sanction Sample Characterization Charges for KSCST - Student Project Programme 46th Series for the year 2022-23 reg;

With respect to the above subject, we request you to sanction the sample characterization (XRD facility) charges for the **KSCST - Student Project Programme 46th Series** entitled “**Graphene Oxide Re-inforced Silk Fibroin Film for supercapacitor applications**” (Proposal Reference No: 46S_MSc_079). The details of the particulars as mentioned below and the bills attached along with covering letter for your reference. Kindly do the needful.

Sl. No.	Particulars	Quantity	Price
1.	XRD Facility	6 samples	2,400.00
Total			2,400.00

Thanking you.

Yours Faithfully


Project Guide
Co-ordinator
Post-Graduate Studies in Physics
K.L.E. Society's S. Nijalingappa College
Bengaluru - 560 010


Principal