



Ref: CRS/2021-22/02/495

Date: 24-06-2022

### Sanction Order

To,  
The Registrar/Principal/Financial Authority,  
Through Dr. TAPANENDU KAMILYA  
Assistant Professor

**Subject: Collaborative Research Scheme(CRS) Project of UGC-DAE CSR entitle**  
'Immobilization of  $\alpha$ -Amylase on Biocompatible Magnetic Nanoparticles and Design of Reusable Nano-Biocatalyst for Starch Hydrolysis ' by Dr. TAPANENDU KAMILYA.

Dear Madam/Sir,

In continuation to our sanction letter the CRS project submitted to UGC-DAE CSR by **Dr. TAPANENDU KAMILYA** of your institution has been approved by the competent authority. The principal collaborator from UGC-DAE CSR is **Dr. Souvik Chatterjee**. The details of the remittance are given below:

Student fellowship(@ ₹14,000/- pm+HRA)	Consumable	Contingency	Total Amount	Date of remittance	UTR No.
₹Nil	₹30,000	₹15,000	₹45000	2022-03-31	SBIN422092079440
No overheads are available under this scheme					

This project has been approved as per the guidelines given below:

1. This is a Collaborative Research Scheme (CRS) of UGC-DAE CSR. In view of the complex and involved nature of the experiments, any publication emerging under the project must be of collaborative in nature with due consents from the scientists at UGC-DAE CSR and/or DAE centres, and in consultation with the Principal Collaborator/Coordinator. Following phrase must be included in the acknowledgement: "This work was partially/fully carried out using the facilities of UGC-DAE CSR. The authors acknowledge the financial support from UGC-DAE CSR through a Collaborative Research Scheme (CRS) project number **CRS/2021-22/02/495**."
2. This project is sanctioned for **one year** but it may be extended on yearly basis subject to a total period of three years.
3. In case the CRS project has been approved without student fellowship, it will not be possible to grant student fellowship in subsequent years as well.
4. The PI must '**Apply for an Experiment Time**' through our online user portal <https://csruserportal.com/> for utilization of each experimental facility each time.
5. The project will be reviewed at the end of each year to consider sanction and financial allocation for the succeeding year.

Principal  
Marafoto Raj College  
Hampi Pin-721 211



**6. The release of grants for the subsequent years can be made only upon receipt of funds from UGC towards the scheme. A separate sanction order will be issued for the subsequent years.**

7. At the end of the financial year (i.e. by March 31) the PI should submit:

- (i) Utilization Certificate in the format provided at our website for the amount spent and
- (ii) A Statement of Expenditure duly signed by the Registrar/Principal/competent financial authority of your university/institution to the Centre-Director of respective Centre. The release of funds for the subsequent year(s) can only be made after receiving the above documents.

8. The UGC-DAE CSR will be able to reimburse the travel expenses to Project Investigators as per rules, limited to 2nd AC train fare visiting a centre on project work. However, the student participant is permitted for a sleeper class train fare by the shortest route and is as per prevailing norms of UGC-DAE CSR.

#### **Rules for selection of a CRS project fellow**

The CRS project fellow (if approved) should be made by an open selection procedure as per UGC guidelines. The recruitment procedure should be completed within 3 months after the release of the sanction order. The details for recruitment are given below:

#	Designation	Remuneration	Qualifications
1	CRS Project Fellow (Junior) -I	₹14,000 + HRA	M.Sc. (not earlier than 3 years) with a minimum of 55% marks in the concerned subject ( <b>for Science</b> ) M.E. / M. Tech. (not earlier than 3 years) 1st Class ( <b>for Engineering</b> )
2	CRS Project Fellow (Senior)-I	₹16,000 + HRA	After completion of 2 years as a <b>CRS Project Fellow (Junior) -I</b> + at least one research paper in a reputed SCI journal + assessment of the student by a 3 member expert committee approved by the Centre-Director
3	CRS Project Fellow (Junior)-II	₹31,000 + HRA	<b>Same as (1)</b> + valid (a) National Eligibility Tests- CSIR-UGC NET including lectureship(Assistant Professor) or GATE or(b) A selection process through National level examinations conducted by Central Government Department and their Agencies and Institutions. + Ph.D. registration of the student under the supervision of the PI at the University where PI's institute is affiliated
4	CRS Project Fellow (Senior)-II	₹35,000 + HRA	After completion of 2 years as a <b>CRS Project Fellow (Junior)-II</b> + at least one research paper in a reputed SCI journal + assessment of the student by a 3 member expert committee approved by the Centre-Director

1. All recruitment should be authorized by a selection committee as per rules of University/Institution in which the PI is working. The advertisement should be widely circulated electronically and a copy should be sent to the Principal Collaborator.

2. For appointing a student in the CRS project, the interview panel must be approved by the Centre-Director of the respective Centre. The PI should inform the interview schedule as least 2 weeks in advance. The entire process should be conducted in an online/hybrid mode.

3. A UGC-DAR CSR nominee along with Principal Collaborator is needed for all interviews and upgradations.

4. For all appointments, it has to be mentioned that it is on purely temporary basis and will co-terminate with the CRS project. Leave rules for the appointed fellow will be as per the host institution of PI.

  
 Principal  
 Narajole Raj College  
 Hooghly, Pin-721 211  


5. Appointment of student in the project is not permitted in the second or third year of the project.

6. While appointing as well as upgrading, a copy of relevant documents including CV along with educational qualification documents (incl. NET/GATE, etc.), minutes of the selection committee/upgradation committee, appointment letter, joining report etc. must be send to the Centre-Director of the respective Centre.

7. The student appointed under this project should spend a substantial amount of time at UGC-DAE CSR.

8. Contingency fund to be utilized for computational work, purchase of stationary and other consumables pertaining to the concerned project. No grant is allocated for any capital equipment/asset.

Copy to: Through User Portal to: Director, concerned Centre-Director, User Office, Dr. TAPANENDU KAMILYA, Dr. Souvik Chatterjee, AO for remittance of funds



A handwritten signature in blue ink, which appears to be 'Anpadhyaya', is written on a grey rectangular background.

Administrative Officer-II  
(UGC-DAE CSR)

S.K.PAUL & CO.  
(Chartered Accountants)  
Partner: Sanjib Singha  
Tel: 03222-210074  
Mob: 9933029183/9475096460

H.O.-237C S.D. Banerjee Road  
Kolkata - 700144  
B.O.- 7A Burdge town(Durga Mandap)  
P.O.-Midnapore  
Paschim Medinipur, 721101

**NARAJOLE RAJ COLLEGE**  
NARAJOLE : : PASCHIM MEDINIPUR

**PROJECT "Immobilization of  $\alpha$ -Amylase on Biocompatible Magnetic Nanoparticles and Design of Reusable Nano-Biocatalyst for Starch Hydrolysis"-Project No: CRS/2021-22/02/495 dt. 24.06.2022.**

**Project No: CRS/2021-22/02/495 dt. 24.06.2022.**

**RECEIPTS AND PAYMENTS ACCOUNT FOR THE PERIOD FROM 01.04.2022 TO 31.03.2023**

<u>RECEIPTS</u>	<u>RS.</u>	<u>P.</u>	<u>PAYMENTS</u>	<u>RS.</u>	<u>P.</u>
To <u>Opening Balance:</u>			By <u>Consumables Expenses:</u>		
Cash in hand			A-Amylase,Sigma aldrich	8,488.92	
" <u>Grant in Aid</u>			Iron(III) chloride	5,363.10	
			Silver Nitrate	8,264.72	
Received from UGC-DAE Consortium Kolkata Centre			Distilled Water, Merck	628.94	
Through NEFT Dated 31.03.2022	45,000.00		Iron(II) chloride	7,254.32	
			Paid through Ch No.144152dt.03/03/2023		30,000.00
			By <u>Contingency Expenses:</u>		
			Paper & Stationary, Files, etc.	5,127.53	
			Beaker, Meas. Cyl., etc	2,116.47	
			Antivirus,keyboard,pdrive,cardidg	6,700.00	
			Printing and Xerox	1,056.00	
			Paid through Ch No.144151 dt.02/09/2022		15,000.00
			" <u>Closing Balance:</u>		
			Cash in hand		Nil
	<u>45,000.00</u>				<u>45,000.00</u>

**AUDITORS' REPORT:**

We report that we have examined the Receipts & Payments A/C of Project "Immobilization of  $\alpha$ -Amylase on Biocompatible Magnetic Nanoparticles and Design of Reusable Nano-Biocatalyst for Starch Hydrolysis" for the period from 1st April, 2022 to 31st March, 2023 with Books and Accounts, Vouchers and Documents produced before us and the same are in agreement therewith.

Place : Midnapore  
Date :13th March, 2023

*Tapanendu Kamilya*  
Dr. Tapanendu Kamilya  
Associate Professor of Physics  
Narajole Raj College  
Narajole, Paschim Medinipur  
13/3/2023



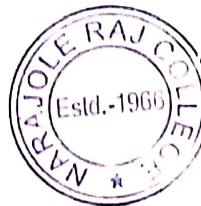
For S.K.Paul & Co.  
Chartered Accountants  
FRN: 304092E  
*[Signature]*  
(Sanjib Singha)  
Partner  
M. NO. 066924

*[Signature]*  
15/07/24  
Principal  
Narajole Raj College  
Narajole, Pin-721 211



*[Signature]*  
Dr. Ranajit Kumar Khaitun  
Vice Principal  
Narajole Raj College  
Narajole, Paschim Medinipur

Vice-Principal  
Narajole Raj College  
P.O.- Narajole  
Dist.- Paschim Medinipur, 721211





Ref: CRS/2021-22/02/495

Date: 2023-03-29

### Sanction Order

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The Registrar/Principal/Financial Authority,  
Through Dr. TAPANENDU KAMILYA  
Assistant Professor

**Subject: Collaborative Research Scheme(CRS) Project of UGC-DAE CSR entitle**  
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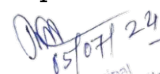
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Principal  
Marajole Raj College  
Marajole Pin-751 211



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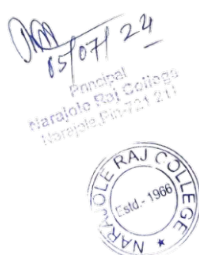


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Copy to: Through User Portal to: Director, concerned Centre-Director, User Office, Dr. TAPANENDU KAMILYA, Dr. Souvik Chatterjee, AO for information.



A handwritten signature in blue ink that reads 'Narian'.

Narian Kr.Lengay  
Administrative Officer-I  
(UGC-DAE CSR)







# Structural and optical properties of chemically synthesized copper oxide nanoparticles and their photocatalytic application

Soumen Rakshit<sup>1</sup>, Krishna Gopal Mondal<sup>1,\*</sup> , Paresh Chandra Jana<sup>1</sup>, Tapanendu Kamilya<sup>2</sup>, and Satyajit Saha<sup>1</sup>

<sup>1</sup> Department of Physics, Vidyasagar University, Midnapore 721102, WB, India

<sup>2</sup> Department of Physics, Narajole Raj College, Paschim Medinipur, WB 721211, India

**Received:** 15 June 2023


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10 November 2023

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## ABSTRACT

The synthesis, characterization, and optical properties of copper oxide nanorods (CuO NRs) based on facile one-step chemical methods using different precursors has been investigated. The field emission transmission electron microscopy analysis confirmed the existence of high crystalline CuO NRs with average length of 100 ~ 500 nm along with the diameter of 20 ~ 150 nm. The nanopetals/nanoflowers with large surface area has been confirmed by the SEM images. Phase purity of the as-synthesized sample having nanocrystalline nature with a monoclinic structure has been confirmed by X-ray diffraction patterns. FTIR was used to verify the various functional groups of CuO NRs. The UV–Visible absorption spectra, photoluminescence, and time-correlated single photons counting were used to study the optical properties. The calculated bandgap values of CuO NRs are 2.86 eV and 2.89 eV for two samples (S-1 and S-2), respectively. Investigation and analysis of the absorbance, reflectance, transmittance, refractive index, extinction coefficient, real and imaginary parts of the dielectric constant, and optical conductivity have been simulated for both samples. The fluorescence lifetimes of S-1 and S-2 are 1.00 ns and 0.98 ns, respectively. In the presence of hydrogen peroxide, the CuO NRs show excellent enhanced catalytic activities for degradation of methylene blue under visible light irradiation with degradation efficiency > 80% within 60 min.

  
Principal  
Narajole Raj College  
Narajole, Pin-721 211



## 1 Introduction

Metal oxides (MOs) and transition metal oxides (TMOs) semiconductors have been shown great interest in scientific field and become more important at present because of their unique properties. TMOs are excellent class of semiconductors having applications

in magnetic storage media, solar cells, electronics, and catalysis, etc. [1–3]. The synthesis of nanoscale TMOs, such as iron oxide, tin oxide, copper oxide, titanium oxide, and so on, is of significant interest owing to their excellent catalytic activity and superior antimicrobial activity against bacteria strains [4–6]. Recently, photocatalytic degradation of organic dyes by TMOs

Address correspondence to E-mail: rspt\_krishnagopalm@mail.vidyasagar.ac.in