

All communications are to be addressed to the
Joint Secretary by designation and not by name



UNIVERSITY GRANTS COMMISSION
EASTERN REGIONAL OFFICE
LB 8 Sector III Salt Lake, Kolkata 700 098
Phone : (033) 335 4767
Fax : (033) 335 0586

University Grants Commission

No. F. PSW-097/06-07 (ERO)

Date : 10.07.2007

To

The Principal
Dr. Bhupendra Nath Dutta Smrity Mahavidyalaya
WB

Subject : Approval of Financial Assistance to Dr./Mr./Ms, Tandrima Chaudhuri of your
College for Minor Research Project.

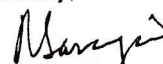
Sir/Madam,

1. The University Grants Commission has approved Minor Research Project, as above, of your College as per the recommendations of the Expert Committee and has also approved an allocation of Rs97000/- for the project as per details given below :

1.	Non-Recurring Items :	Amount (in Rupees)
a.	Books and journals	5000
b.	Equipment	25000
2.	Recurring Items :	
a.	Field Work and Travel	5000
b.	Chemicals and Glassware	50000
c.	Contingency (including special needs)	12000
	Total :	97000

2. The terms and conditions of the grant will be as per the Guidelines of the scheme.
3. A sanction letter (100% of non-recurring and 50% of recurring grant) is enclosed herewith.
4. The College is requested to submit 'Acceptance Certificate' duly signed by the Principal and the Principal Investigator.
5. The date of implementation will be the date of receipt of the first demand draft by the College and may be intimated in the Acceptance Certificate.

Yours faithfully,


(Dr. Ratnabali Banerjee)
Joint Secretary

Copy forwarded for information & necessary action to:

1. The Registrar, Burdwan University
2. The Director of Public Instructions (Higher Education), Govt. of WB
3. Dr./Mr./Ms Tandrima Chaudhuri
4. Guard file


(Dr. Ratnabali Banerjee)
Joint Secretary

**UNIVERSITY GRANTS COMMISSION
EASTERN REGIONAL OFFICE
[B-8 Sector - III Salt Lake, Kolkata 700 098]**

PSW-097/06-07 (ERO)

Date: 19-Feb-07

Accounts Officer
University Grants Commission
Eastern Regional Office, Kolkata 700 098

S.No. 82409

Sub : Release of Grant-in-Aid during the Current financial year, under Plan, to
Dr Bhupendranath Dutta Smriti Mahavidyalaya

Madam,

is directed to convey the sanction of the Commission for payment of Rs. 63500 towards the scheme **Minor Research Project in Science** to the Principal, Dr Bhupendranath Dutta Smriti Mahavidyalaya for the Plan expenditure to be incurred during the current financial year as per details given below:

Purpose of the grant	Approved allocation	Amount already sanctioned	Amount being sanctioned now	Total grant including the grant now being sanctioned
	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Drima Chaudhuri, Chemistry	97000	0	63500	63500
Total			63500	

The College is requested to note:

- Audited Utilisation Certificates and statements of Expenditure of all grant sanctioned during a financial year under various schemes of the UGC are to be submitted separately for each schemes latest by 31st December after the financial year ending.
- No photocopy of bills/vouchers or the originals and detailed list of purchases should be sent with the accounts submitted unless specifically called for.

The sanctioned amount is debitable to the major head 5.1.3 and valid for payment during the current financial year only. The amount of the grant shall be drawn by the Accounts Officer (Drawing and Disbursing Officer), University Grants Commission on the Grant-in-Aid bill and shall be disbursed to and credited to grantee as above through Demand Draft. The grant is subject to the adjustment on the basis of Utilisation Certificate in the prescribed proforma submitted by the University/College/Institution.

The University/College shall maintain proper accounts of the expenditure out of the grant which shall be utilised only on approved items of expenditure

The Utilisation Certificate to the effect that the grant has been utilised for the purpose for which it has been sanctioned shall be furnished to the University Grants Commission as early as possible after the closing of the current financial year.

The assets acquired wholly or substantially out of the University Grants Commission's grant shall not be disposed or encumbered or utilised for the purpose other than those for which the grant was given, without proper sanction of the University Grants Commission.

A register of assets acquired, wholly or substantially out of the grant shall be maintained by the University/College in the prescribed form.

The grantee institution shall ensure the utilization of grants-in-aid for which it is being sanctioned/paid. In case of non-utilization/part utilization, the simple interest @6% per annum as amended from time to time on unutilized amount from the date of drawal to the date of refund as per provisions contained in General Financial Rules of Govt. of India will be charged.

The University/College shall follow strictly all the instructions issued by the Government of India from time to time with regard to reservation of posts to Scheduled Castes and Scheduled Tribes.

The University/College shall fully implement the Official Language Policy of the Union Govt. and comply with the Official Language Act, 1963 and Official Languages (used for official purposes of the Union) Rules, 1976 etc.

The sanction issues in exercise of the delegation of powers vide Commission Office Order No. 25/92 dated May 01, 1992.

An amount of Rs. out of the grant of Rs. sanctioned vide letter No. F. (ERO) dated..... has been utilized by the College for the purpose for which it was sanctioned and noted in the Grant-in-Aid Register.

The funds to the extent are available under the Scheme.

Copy forwarded for information and necessary action to :
Principal

Yours faithfully,

Dr Bhupendranath Dutta Smriti Mahavidyalaya
Hatgobindapur Burdwan
West Bengal 713407

(Dr. Ratnabali Banerjee)
Joint Secretary

She is requested to abide by these instructions/Guidelines of sanction order.
Registrar/ Director, Co-ordinator, College Development Council, Burdwan University
Auditor General, Govt. of West Bengal
The Secretary, Higher Education, Govt. of West Bengal
The Director of Public Instructions (Higher Education) Govt. of West Bengal.

(Dr. Ratnabali Banerjee)
Joint Secretary

Tandrima Chaudhuri, Chemistry



UNIVERSITY GRANTS COMMISSION
EASTERN REGIONAL OFFICE
LB 8 Sector III Salt Lake, Kolkata 700 098

No. PSW-097/06-07 (ERO)

Date: 19-Mar-08

The Accounts Officer
University Grants Commission
Eastern Regional Office, Kolkata 700 098

S.No. 86285

Sub : Release of Grant-in-Aid during the Current financial year, during XIth Plan, to

Dr. Bhupendra Nath Dutta Smriti Mahavidyalaya

Sir/Madam,

I am directed to convey the sanction of the Commission for payment of Rs. 26800 towards the scheme **Minor Research Project in Science** to the Principal, **Dr. Bhupendra Nath Dutta Smriti Mahavidyalaya** for the Plan expenditure to be incurred during the current financial year as per details given below:

Purpose of the grant	Approved allocation	Amount already sanctioned	Amount being sanctioned now	Total grant including the grant now being sanctioned
Tandrima Chaudhuri, Chemistry	(Rs.)	(Rs.)	(Rs.)	(Rs.)
2nd instalment				
MRP	97000	63500	26800	90300
			Total	<u>26800</u>

The College is requested to note:

- Audited Utilisation Certificates and Statements of Expenditure of all grants sanctioned during a financial year under various schemes of the UGC are to be submitted separately for each scheme latest by 31st December after the financial year-ending.
- No photocopy of bills/vouchers or the originals and detailed list of purchases should be sent with the accounts submitted unless specifically called for.

- The sanctioned amount is debit to the major head 4.(ii)b) and valid for payment during the current financial year only.
- The amount of the grant shall be drawn by the Accounts Officer (Drawing and Disbursing Officer), University Grants Commission on the Grant-in-Aid bill and shall be disbursed to and credited to grantee as above through Demand Draft.
- The grant is subject to the adjustment on the basis of Utilisation Certificate in the prescribed proforma submitted by the University/College/Institution.
- The University/College shall maintain proper accounts of the expenditure out of the grant which shall be utilised only on approved items of expenditure.
- The Utilisation Certificate to the effect that the grant has been utilised for the purpose for which it has been sanctioned shall be furnished to the University Grants Commission as early as possible after the closing of the current financial year.
- The assets acquired wholly or substantially out of the University Grants Commission's grant shall not be disposed or encumbered or utilised for the purpose other than those for which the grant was given, without proper sanction of the University Grants Commission.
- A register of assets acquired, wholly or substantially out of the grant shall be maintained by the University/College in the prescribed form.
- The grantee institution shall ensure the utilization of grant-in-aid for which it is being sanctioned/paid. In case of non-utilization/part utilization, the simple interest @10% per annum as amended from time to time on unutilized amount from the date of drawal to the date of refund as per provisions contained in General Financial Rules of Govt. of India will be charged.
- The University/College shall follow strictly all the instructions issued by the Government of India from time to time with regard to reservation of posts to Scheduled Castes and Scheduled Tribes.
- The University/College shall fully implement the Official Language Policy of the Union Govt. and comply with the Official Language Act, 1963 and Official Languages (used for official purposes of the Union) Rules, 1976 etc.
- The sanction issues in exercise of the delegation of powers vide Commission Office Order No. 25/92 dated May 01, 1992.
- An amount of Rs. _____ out of the grant of Rs. _____ sanctioned vide letter No. F. _____ (ERO) dated _____ has been utilized by the College for the purpose for which it was sanctioned and noted in the Grant-in-Aid Register.
- The funds to the extent are available under the Scheme.

Copy forwarded for information and necessary action to :

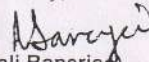
1. Principal

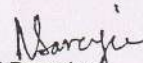
Dr. Bhupendra Nath Dutta Smriti Mahavidyalaya
Hatgobindapur Burdwan
West Bengal 713407

He/She is requested to abide by these instructions/Guidelines of sanction order.

- Registrar/ Director, Co-ordinator, College Development Council Burdwan University
- Auditor General, Govt. of West Bengal
- The Secretary, Higher Education, Govt. of West Bengal
- The Director of Public Instructions (Higher Education) Govt. of West Bengal
- Tandrima Chaudhuri, Chemistry

Yours faithfully,


(Dr. Ratnabali Banerjee)
Joint Secretary


(Dr. Ratnabali Banerjee)
Joint Secretary

Final Report of the work done on the Minor Research Project

1. Project report No. : PChem-002/07-09 (UGC)
2. UGC Reference No. : PSW-097/06-07 (ERO)
3. Period of report : From - 11th. Feb, 2007 To - 10th.Feb, 2009
4. Title of research project : Exploration of optical and solvation characteristics of a few probe molecules by experimental and theoretical techniques.
5. (a) Name of the Principal Investigator : Ms Tandrima Chaudhuri
(b) Deptt. and University/College where work has progressed :
Department of Chemistry, Burdwan University
6. Effective date of starting of the project : 16.04.2007
7. Grant approved and expenditure incurred during the period of the report.
 - (a) Total amount approved Rs. : 90,300
 - (b) Total expenditure Rs. : 91,207
8. Report of the work done : Sheet attached
 - (i) Brief objective of the project :
 - a) Primarily for fetching doctoral degree by the P.I
 - b) Enriching the relevant area of knowledge.
 - (ii) Work done so far and results achieved and publications, if any, resulting from the work :

A paper entitled

1. *"Design and Development of a New Pyrromethene Dye with Improved Photostability and Lasing Efficiency: Theoretical Rationalization of Photophysical and Photochemical Properties"* is published in Journal of Organic Chemistry, ACS on 2008. [Copy attached]
2. *"A photophysical study of the C-8 Phenyl analogue of PM567 Interacting with fullerenes in different solvent environments – rationalized through ab initio theoretical model calculations in gas phase"* is communicated to Journal of Physical Chemistry, ACS on 2008. [Copy of the 1st. page attached]

3. "Luminescence of mes-tetra-2-chlorophenylporphyrin and Its Molecular and supramolecular Interactions with Chloranils and Fullerenes" is communicated to Journal of Physical Chemistry, A, ACS on 2008 and is revised now on Feb,2009. [1st. page of revised copy is attached ~~here~~].

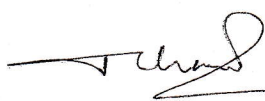
(iii) Has the progress been according to original plan of work and towards achieving the objectives? If no, state reason : Yes.

(iv) Indicate the difficulties, if any : No difficulties arise.

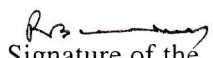
(v) If project has not been completed, please indicate the approximate time by which it is likely to be completed : NA

(vi) If the project has been completed, enclose a summary of the finding of the study :

Two broad copies of the final report of work is enclosed.


Signature of the 28/2/09

Principal Investigator

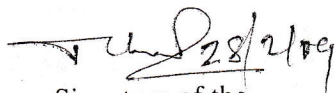

Signature of the

Principal of College

Principal
Dr. Bhupendra Nath Datta
Smriti Mahavidyalaya
Hatgobindapur, Burdwan

Utilization Certificate

Certified that the grant of Rs. 26,800 (Rupees Twenty six thousand eight hundred only) received in the 2nd instalment from the University Grants Commission under the scheme of support for Minor Research Project entitled "Exploration of optical and salvation characteristics of a few probe molecules by experimental and theoretical techniques" vide UGC letter No PSW-097/06-07 (ERO) dated 19.03.2008 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grant Commission.



Signature of the
Principal Investigator



Signature of the

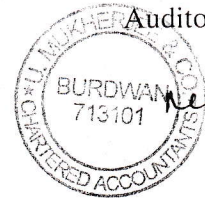
Principal

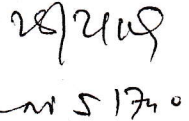
Principal
Dr Bhupendra Nath Datta
Smriti Mahavidyalaya
Hatgobindapur, Burdwan



Signature of the

Auditor




28/2/09
New No 51740

FINAL REPORT OF THE PROJECT

**“EXPLORATION OF OPTICAL AND SOLVATION CHARACTERISTICS
OF A FEW PROBE MOLECULES BY EXPERIMENTAL AND
THEORETICAL TECHNIQUES”**

FOR THE PERIOD
11th. February, 2007—10th. February, 2009

SUBMITTED TO
UGC
EASTERN REGION OFFICE

BY
Ms. TANDRIMA CHAUDHURI
DEPARTMENT OF CHEMISTRY
DR.BHUPENDRANATH DUTA SMRITI MAHAVIDYALAYA
HATGOBINDOPUR
BURDWAN

FEBRUARY 2009

Plan of work as proposed

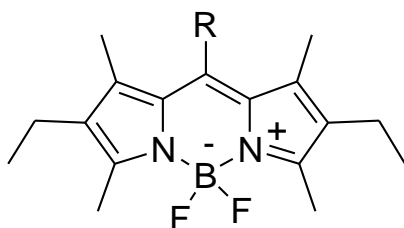
The tenure of the project was 2 years. In the minor research project the total work was divided into three major aspects, viz.,

- (i) Photophysical study that deals with the Absorption and Fluorescence spectrometric study of several Dye molecules in different pure and mixed solvents to get information about their solvated and electronically excited states.
- (ii) Study of intermolecular interactions of the Dye molecules with some electron acceptors in different solvent environments.
- (iii) Quantum chemical calculations through *ab initio* and DFT theories.

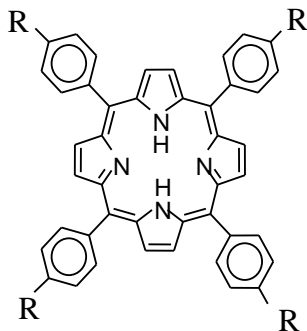
Dyes Used

Mainly two types of Dye molecules were chosen

1. *Pyromethene BF₂ Dyes* which are well known as LASER dye.



2. *meso-tetraphenylporphyrins* which are active for photosynthesis in Chlorophylls of plant leaves.



1st year work report

In the 1st year I have tried initially to procure the Pyromethene dyes through collaboration with the Bio-Organic Division, BARC, Mumbai and designed the model calculations for obtaining better photostability of the dyes through modification of substituent groups. Initially, I obtained two dyes one of which is commercially available as PM567, a well-known laser dye. The other compound is its phenyl derivative, which was synthesised at BARC, Mumbai. I have studied solvatochromatic characteristics of the dyes by UV-VIS spectroscopic measurements; steady state fluorescence spectrometry as well as time resolved fluorescence spectroscopy in some pure solvents. I found very little shift of wavelength with change in polarity of solvent. After getting the experimental results, theoretical calculations were performed for structural optimisation; excitation energies, HOMO-LUMO, band gap, dipole moments etc. for the PM567 and its phenyl analogue. Computations were done using SPARTAN '02 and Gaussian'03 software. Theoretical calculations agree with experimental results satisfactorily. Then we designed with the help of theoretical tools two new dye molecules viz. (i) Φ -OMe substituted at C₈ and (ii) Φ -2,4,6-tri OMe substituted at C₈ of the PM567 chromophore. Our BARC collaborator group had synthesised these two dyes and they found better photostability and lasing efficiency of the later dye, as compared to all others. This work has been published by American Chemical Society, in the Journal of Organic Chemistry in 2008.

2nd year work report

In the 2nd. year of tenure I have studied weak intermolecular interactions that appear due to complexation between the Pyromethene dyes (acting as electron donor) and the well known electron acceptors like fullerenes. Here we got environment sensitive selectivity of C-8 phenyl analogue of PM567 for fullerene-[60] and fullerene-[70]. This work was communicated to an international journal for publication.

I have worked in the last year with another kind of dye molecules possessing biological importance. Such are compounds like Porphyrin, Phthalocyanine etc. Porphyrin is a heterocyclic compound that is present in leaves of plants and is the key to photosynthesis. I started working with free base *meso*-tetraphenylporphyrin having different substitutions in the phenyl ring. In the 2nd year I tried to procure the Porphyrins from Bio-Organic Division, BARC, Mumbai and studied solvatochromatic characteristics of the dyes by UV-VIS spectroscopic method, steady state fluorescence spectroscopy as well as time resolved fluorescence spectroscopy in some pure solvents. We got very significant variation in lifetime coefficient of the bi-exponential fit of fluorescence intensity of *meso*-tetra(2-chlorophenyl)porphyrin in time-resolved emission study. We got little shift of wavelength with the change in polarity of solvent. After obtaining the experimental results, theoretical calculations were done for structural optimisation, excitation energies, HOMO-LUMO energies, band gap, dipole moments etc. of the porphyrin using SPARTAN '02 and Gaussian'03 software. Theoretical results agreed well with the experimental values satisfactorily. In the next tenure I have studied weak intermolecular interactions that appear due to complexation between the Porphyrin (acting as electron donor) and some well known electron acceptors like fullerenes, chloranils etc. through spectroscopic and theoretical methods. Here we explored different mechanisms of quenching of fluorescence of the Porphyrin with fullerenes and chloranils in non polar non interactive toluene medium. In Porphyrin/fullerene complexes purely static quenching takes place, on the contrary for Porphyrin/chloranil complexes a combined static and dynamic quenching occurs. This work has been also communicated to an international journal for publication.

Project Output

Publications

Name of Journal	Year	Volume	Page no.	Title of Paper
Journal of Organic Chemistry, ACS	2008	73	2146 - 2154	<i>Design and Development of a New Pyrromethene Dye with Improved Photostability and Lasing Efficiency: Theoretical Rationalization of Photophysical and Photochemical Propertie</i>
Journal of Physical Chemistry A, ACS	Revised on Feb, 2009			<i>Luminescence of 2-Chloro mesotetraphenylporphyrin and its molecular and supramolecular interactions with Chloranils and Fullerenes</i>
Journal of Physical Chemistry A, ACS	Communicated on Nov, 2008			<i>A photophysical study of the C-8 Phenyl analogue of PM567 interacting with fullerenes in different solvent environments – rationalized through ab initio theoretical model calculations in gas phase</i>
To be communicated sortly				<i>Inclusion properties of [60]-fullerene with a series of meso-tetraarylporphyrins.</i>

Presentation of Paper

- In an UGC – sponsored National Seminar on “Advanced Spectroscopy, Theoretical Chemistry, Synthesis, Reactivity & Structure Evaluation” held on 20-22nd Feb, 2009 in the department of Chemistry, University of Burdwan, I had presented a Paper entitled “ *Inclusion properties of [60]-fullerene with a series of meso-tetraarylporphyrins*”.

Conclusion & Acknowledgements

I have considered two different kinds of Dye molecules for this work and have got a large variety of results for each type upon substitution.

For pyromethene dyes, Lasing property changes with substitutions as well as for interaction of PM dyes with fullerenes, PM567 has larger binding affinity with [60]-fullerene as compared to [70]-fullerene while its phenyl analogue has just the opposite trend. Thus by replacing the electron donating methyl group with withdrawing phenyl group on dye chromophore intermolecular interaction alters the selectivity for fullerene.

In case of porphyrins, heavy atom substitution on phenyl groups quenches the emission intensity. For halo-substituted TPP I have obtained a nice observation, the time resolved emission could be fitted with a bi-exponential decay equation. There we got vibronic coupling in the emitting states of that porphyrin. Similarly for intermolecular part of study I have explored different quenching mechanisms for fluorescence of Porphyrins quenched by various electron acceptors.

Quantum chemical calculations for structure optimisation excited state calculation, energies of HOMO and LUMO the frontier orbitals as well as ^1H NMR calculations always gave extensive support of the experimental findings.

At the completion of my project work I express my sincere gratitude to University Grand Commission for this essential financial help.

Place : Dr. B.N.D.S.M., Burdwan

Date :

(T. Chaudhuri)

Principal Investigator