

Department of Chemistry

DST-FIST and UGC-SAP Funded

*Surging Ahead
with
Excellence, Quality and Values*

A Brief Profile and Progress
Report (2013-23)



Overview of the



- The Department had a modest beginning in 1953 as a part of REI Degree College, Agra University, since 1981 became full fledged Department of DEI
- **Focused Academic Program, Qualified Faculty, Strict adherence to the academic calendar**
- Strong commitment towards excellence in teaching and research in areas relevant to the society
- **Equipped with a wide range of sophisticated analytical and experimental facilities to support its research and teaching activities**
- **DST-FIST and UGC-SAP Sponsored**

Vision

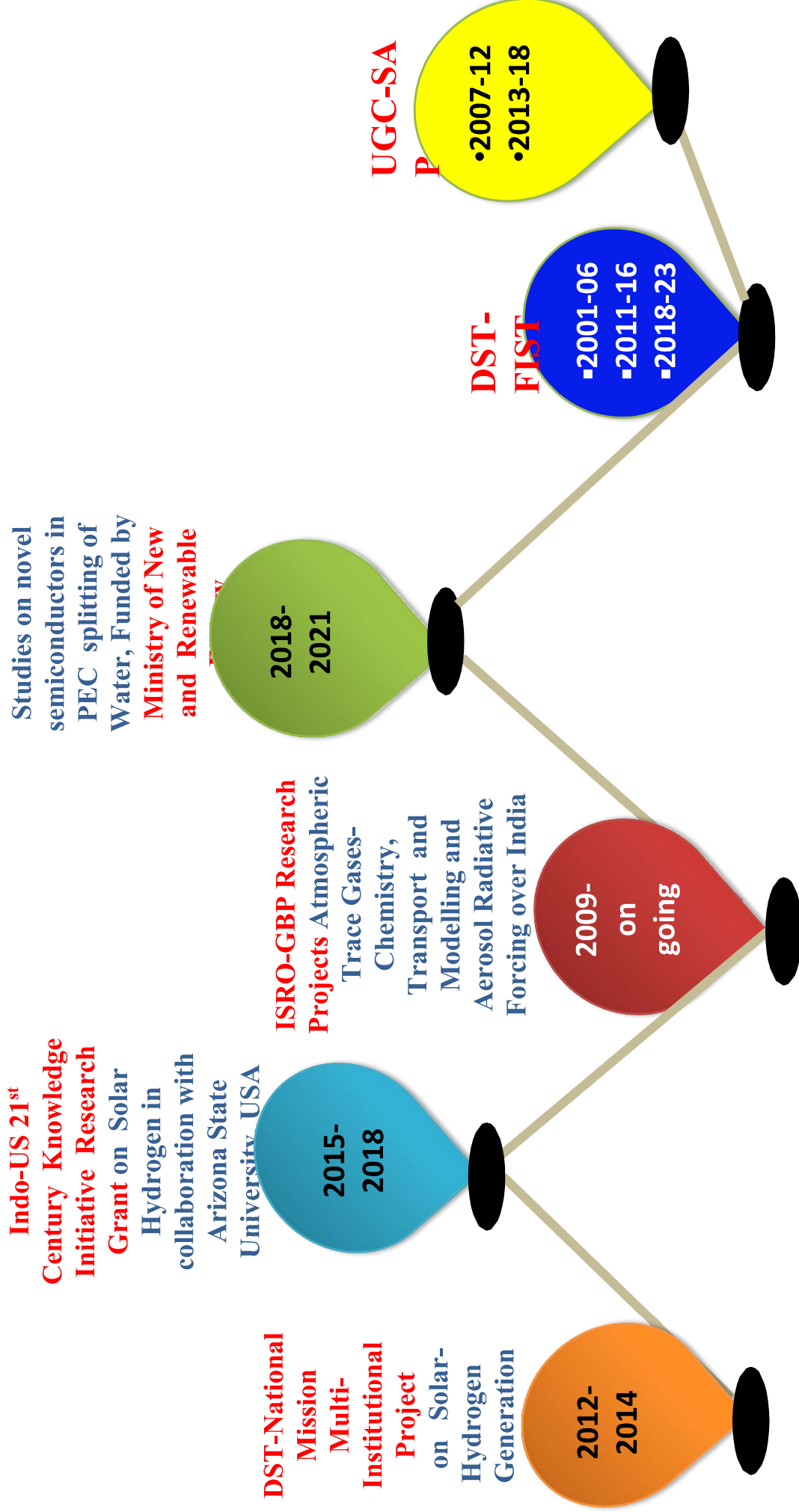
*In sync with Institute's
Vision of Sigma Six Q- V*
Discover, Develop, Design
and Decipher

*New Frontiers in Renewable Energy,
Materials, Phytopotentials,
Atmospheric Studies through
Teaching, Research and Collaboration
towards*

SUSTAINABILITY



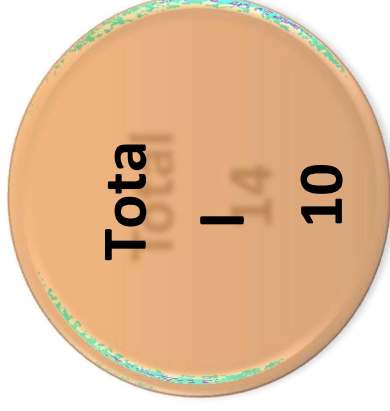
Major Achievements



Brief Profile

- Teaching Staff
 - All are Ph.D.
 - 60 %

Women



- No. of Students: 210
- Ph.D.: 18
- M.Sc.: 29
- B.Sc.: 76



Awards

- ✓ Academy's Summer Research Fellow, IASc-INSA-NASI, 2013
- ✓ **Raman Post-Doctoral Fellow, USA, 2013**
- ✓ Environmentalist of the Year, 2014
- ✓ **Visiting Faculty, Dept. of Energy Env. and Chem. Engg., USA, 2014**
- ✓ Visiting Professor, University of Malaya, Malaysia, 2013-2015
- ✓ Guest of Honour, Intl. Assoc.

Total

Awards: 70

Student Awards

- Bhaskara Advanced Solar Energy (BASE), 2018 : Fellowship Award supported by DST and Indo- U.S. Science and Technology Forum (IUSSTF)
- **ISCA Young Scientist Award- 2018**
- **25 Best paper Awards/ Young Scientist Awards**
- **Best M.Phil Thesis Award**
- **Best Teaching Assistant Award**

Fellowships

- **DST-INSPIRE - 6**
- **CSIR-SRF - 5**
- **Rajiv Gandhi National Fellowships - 1 ; UGC-BSR-11; DST-SERB; UGC-NFOBC- 2 ; UGC-NET-1 ; ISRO-GBP- 2 ; UGC (Indo-US Project)-2**

Alumni

Achievements

- **Awards:** M.Sc. Dissertation, IISER, Pune
- **DAAD Fellowship**
- **N-PDF-DST**
- **Marie Sklodowska-Curie Ph. D Fellowship: University of Central Lancashire 2019**



Award

Total Awards: 60

- ✓ Academy's Summer Research Fellow, IASc- INSA-NASI, 2013
- ✓ Raman Post-Doctoral Fellow, USA, 2013
- ✓ Environmentalist of the Year, 2014
- ✓ Visiting Faculty, Dept. of Energy Env. and Chem. Engg., USA, 2014
- ✓ Visiting Professor of University of Malaya, Malaysia, 2013-2015
- ✓ Guest of Honour, Intl. Assoc. of Advanced Materials, Sweden, 2017

Alumni

Achievements

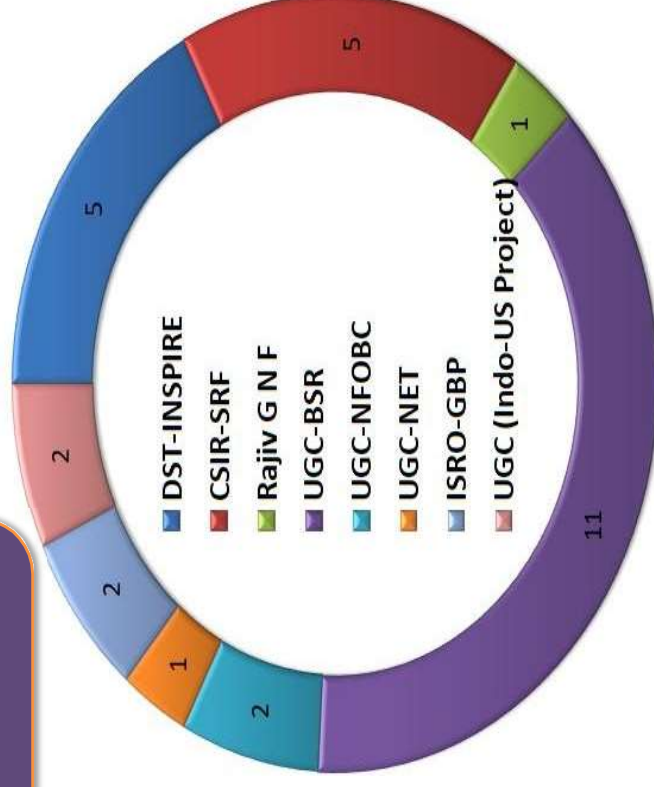
- Best M.Sc. Dissertation, IISER, Pune
- Best Teaching Assistant Award Awards:
- DAAD Fellowship
- N-PDF-DST
- Marie Sklodowska-Curie Ph. D Fellowship: University of Central

Student Awards

- Bhaskara Advanced Solar Energy (BASE), 2018
- ISCA Young Scientist Award- 2018
- 25 Best paper Awards/ Young Scientist Awards
- Best M.Phil Thesis Award

Invited Talks

International: 20
National: 30



Recognitions



Invited Talks (International)

Total No.: 22

Department of Earth and
Atmospheric Sciences, St.
Louis University, St. Louis,
USA, 2014

GEOMAR, Kiel,
Germany, 2014

Oakland
University, USA,
201

Department of
Metallurgical
Engineering at
University of
Utah, Utah, USA, 2016

University of
Waterloo,
2016

Baltic Conference
Series, Stockholm, Sweden, 2017

Chalmers University of
Technology,
Gothenberg
, Sweden, 2017

Uppsala
University, Sweden,
2017

Helmholtz
Zentrum,
Munich, 2018

Desert Research
Institute,
Reno, Nevada,
USA, 2018

Institute of Physical
Chemistry CAU, Kiel, 2018

National
Renewable Energy
Laboratory, USA,
2018

4

Recognitions



Invited Talks (National)

Total No.: 40

National Conference
on Materials and their
Energy Applications
(Delhi, 2014)

Indo-German Conclave
of Lindau Alumni
(IGCLA) at
KMC, Manipal
University, Manipal, 20
15

International Conference
on Energy,
Functional Materials
and Nanotechnology
Nainital, 2016

IEEE Conference,
Agra 2016

International Conference
on Recent Advances in
Fundamental and
Applied Sciences
(RAFAS), LPU, 2016

International
Conference on
Advanced
Nanomaterials and
Nanotechnology
(ICANN), IIT
Guwahati, 2017

National Workshop
on Hydrogen
Energy and Fuel
Cells, Delhi, 2017

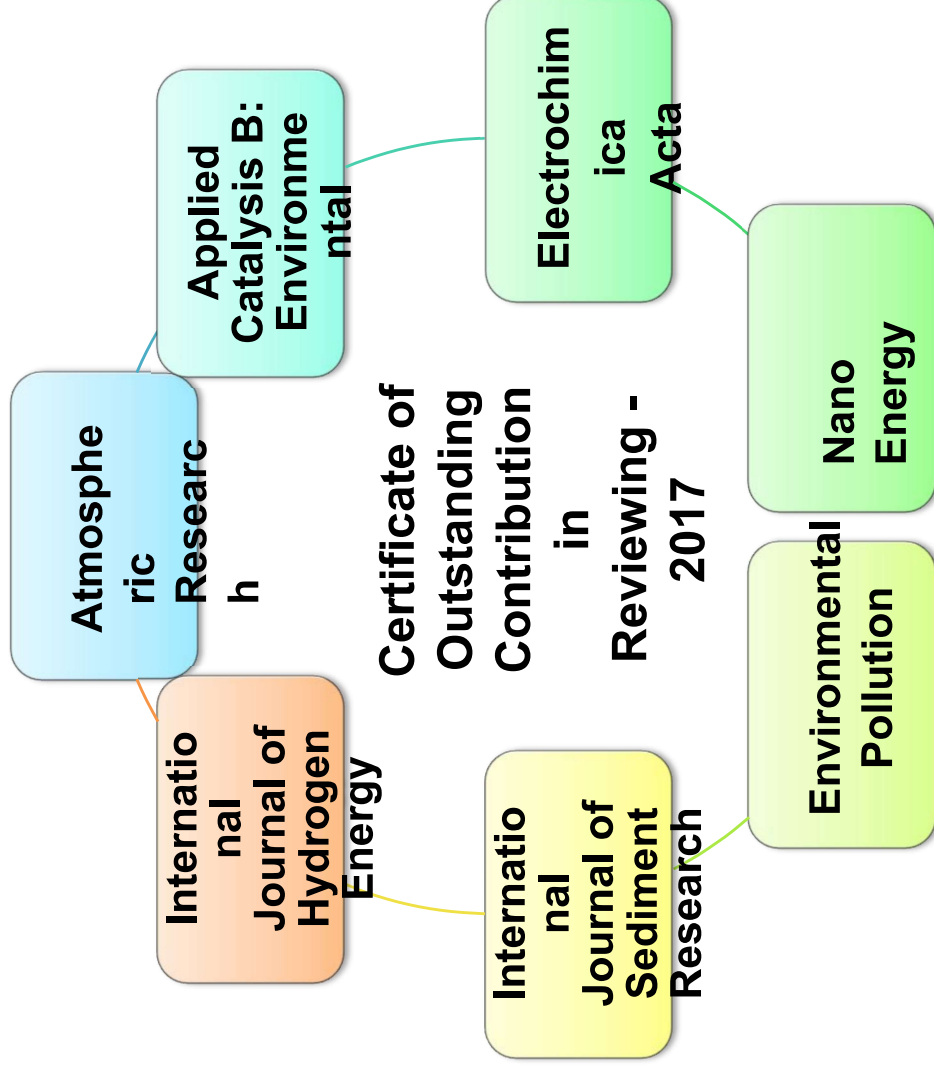
Indian National
Young Academy of
Science (INYAS)
Delhi, 2018

Annual Conference
of Indian Council of
Chemists, NIT
Surathkal 2018

International Symposium
of Eco-Materials
Processing and Design,
Jaipur, 2018

Recognitions

- **Member, Green Chemistry, 2014**
- **Member, Executive Committee ICC, Agra, 2016**
- **Member, Indian National Science Academy, New Delhi**
- **Executive Member, Ultrasonic Society of India**
- **Fellow, Royal Society of Chemistry, 2015**
- **Guest Editor, Proceedings of Indian National Science Academy, 2018**
- **Editorial Board Member, General Chemistry, USA, 2019**



Recognitions

Faculty as Reviewers for Journals

1. Atmospheric Research
2. ~~Science of the Total Environment~~ *International Journal of Sediment Research*
4. *International Journal of Hydrogen Energy*
5. *Environmental Pollution*
6. *Environmental Science and Pollution Research*
7. *Nano Energy*
8. *Electrochimica Acta*
9. *Applied Catalysis B: Environmental*
10. *Journal of Hazardous Materials*
11. *ACS Applied Material and Interface*

Reviewers for Extra Mural Projects

- DST
- CSIR
- OPUS- Poland

Faculty as External Examiners for Ph.D Thesis

1. IIT, Delhi
2. IIT, Kanpur
3. Shiksha 'O'
Anusandhan, Bhubaneswar
4. CECRI, Kariakudi
5. *University of Malaya, Malaysia*
6. *Cochin University of Science and Technology, Kochi*
7. *Maharaja Ganga Singh University, Bikaner, Rajasthan*
8. *Jiwaji University, Gwalior*



Best Paper Awards to



Ms. Sonal
Kumari
(2017)



Ms. Anamika
Banerjee
(2017)



Pratima Gupta receiving ISCA Young Scientist award from Hon'ble Nazma Hegarullah, Governor of Manipur, 2018

Ms. Pratima
Gupta
(2017)



Kiran Singh
(2015)



Ms. Pooja
Chahar,
(2018)



Ms. Rohini
Singh
(2018)



Mr. Saurabh
Yadav
(2019)



Ms. Anuradha
Verma
(2016)

- Puneet Kumar Verma
IASTA-

Best Paper Awards to

IshaStu

45TH (INTER) NATIONAL SYSTEMS CONFERENCE (NSC 2022)
Global Sustainability through Lacto-Vegetarian Agroecology Systems

CERTIFICATE OF ACHIEVEMENT

Certified that
Isha Goyal, Muskan Agarwal, Simran Bamola and Anita Lakhani
presented a paper entitled
Comparative analysis of air quality over the Indo Gangetic Plain (IGP) in the era of COVID-19:
Normal to the new normal
that was Awarded as the Best Paper for Environment Systems
at the 45th (Inter) National Systems Conference (NSC 2022) organized on 26 – 29 September 2022
jointly by Dayalbagh Educational Institute and Systems Society of India.

Dr. Prem Sewak Sudhish Convener NSC 2022
Dr. Anshu Sahni Convener NSC 2022
Prof. D. Bhagwan Das Secretary Systems Society of India



Ms. Neelam Baghel
Women Scientist Award
2022

Neelam Baghel

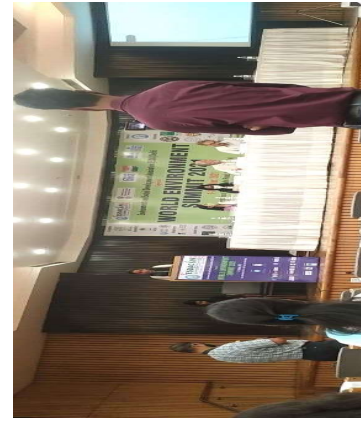
Member of the Jury - ICAQM 2021 (Voluntary Function)

ICAQM-2021
INTERNATIONAL CONFERENCE ON AIR QUALITY MANAGEMENT

Technical Session II: Chemical characterization and Gaseous Pollutants measurements
Winners

First position	Neelam Baghel, Dayalbagh Short Term Variability On-Air Quality Impact Of Volatile Organic Compounds, PM2.5 And Trace Gases (CO, NOx And O3) During Diwali Festival Dayalbagh, Agra Dr. Ashish N. National Institute of Foundry and Forge Technology, Jharkhand
Second Position (Joint winners)	Health Risk Assessment of Potentially Toxic Elements And Their Source Contribution in Urban Street Dust Jhjh. Jose, VIT, Vellore

Gunjan Goswami



Ms. Neelam Baghel
2nd Prize for Oral Presentation
2022

INDIAN INSTITUTE OF TROPICAL METEOROLOGY, PUNE
ITM-ENVIRONMENTAL INFORMATION SYSTEM Resource Partner
(Ministry of Environment, Forest & Climate Change, Govt. of India)

NATIONAL SCIENCE DAY - 2021

This is to certify that Mr./Miss. **NEELAM BAGHEL** as Winner in **Quiz Competition** organized by ITM - Environmental Information System Resource Partner to celebrate the "National Science Day - 2021" at Indian Institute of Tropical Meteorology, Pune.

28th February 2021
Convener
ITM-ENVIS, Pune



Ms. Gunjan Goswami
Best Oral Presentation
2022



Ms. Neelam Baghel
Best Oral Presentation
Award
2021



Ms. Gunjan Goswami
3rd Prize for Oral Presentation
2022



Best Paper Awards to

Runjith Duke



**Ms. Runjhun Dutta
Prof. H.J. Arnikar Award
2022**

Gunjan



**Ms. Gunjan
Best Poster Presentation Award
2022**

Simran Bamola

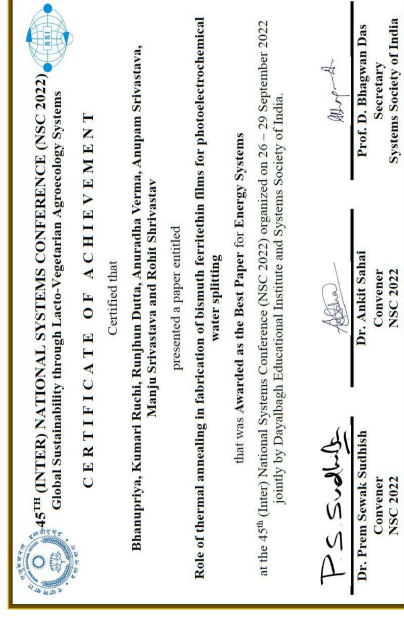


Kumari Ruchi



**Ms. Kumari Ruchi
Best Paper (3rd) Presentation Award
2022**

Bhanupriya



**Ms. Bhanupriya
Best Paper Presentation Award at 45th (Inter)
National Systems Conference (NSC 2022)**

**Ms. Kirti Singh, participated as
a Youth Panellist for Clean Air
Asia India**





Fellowships

Student Awards

- *Nominated to participate in the 70th Lindau Nobel Laureate Meeting, July 2020*
- *Bhaskara Advanced Solar Energy (BASE), 2018*
- *ISCA Young Scientist Award- 2018*
- *Best M. Phil Thesis Award, 2017*
- *20 Best Paper/ Poster Awards*
- *Young Scientist Awards*

◆ **Joint CSIR-UGC**

NET JRF

◆ **DST-Inspire**

◆ **Various Project
Fellowships**

1. Curricular Aspects

Programmes Offered

- B.Sc. (Hons.) Chemistry
- M.Sc.
- M.Phil.
- Ph.D.
- Diploma in Ayurveda (Upvaid)

Syllabi is reviewed every year in

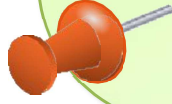
- *Board of Studies in consultation with experts from premier Institutes such as IIT Delhi, IIT Kanpur, IIT Roorkee, BHU, Delhi University, Jiwaji Univ., Gwalior, Univ. of Lucknow*
- *Faculty Board and Academic Council*

Contemporary, latest topics as per UGC- model syllabus and CSIR Competitive Exams are included



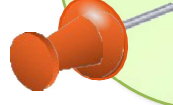
1. Curricular Aspects

Recent Initiatives



Initiated Collaboration with Eminent Scientists from Institutes under Ph.D Programme

- IUAC, New Delhi
- JNCASR, Bangalore
- Delhi University
- Jiwaji University, Gwalior Nehru Cancer
Jawaharlal and Research
Hospital
Centre, Bhopal



Introduction of Special Papers/ Topics on Emerging Areas of Knowledge in Chemistry

- Application of Spectroscopy
- Chemistry of Biosystems
- Recent Advances in Chemistry
- Advanced Scientific Methodology and Analysis



1. Curricular Aspects

Industrial Exposure to UG and PG Students

- Inter University Accelerator Centre, New Delhi
- International Centre for Genetic Biotechnology (ICGEB), New Delhi
- Intertech Pvt. Ltd., Gurgaon
- Sun Pharma Laboratories, Gurgaon
- Mathura Refinery
- Indian Oil R&D Center, Faridabad
- Narora Atomic Power Plant

Hands on Experience on Sophisticated Instruments to UG and PG Students in Laboratory Classes

- XRD
- Electrochemical Work Station
- SEM
- AAS
- GC-MS
- AFM
- UV-Vis spectrophotometer
- HPTLC
- Online Analyzers (NO_x, CO, O₃)

Science Academies' Summer Research Fellowship Programme

Visit of students from/to other Universities/Research Centres to work on short term projects

Exposure to Students on Recent topics through Invited Talks by Eminent Scientists



2. Teaching-Learning



- **Innovations in Teaching**
 - Collaboration and visits to Institutes, Industries and R & D labs
 - Extra classes, Remedial teaching, support from Research scholars
- **Student-centric methods**, such as experiential learning, participative learning and problem solving methodologies
 - **Teaching Methodology:** GDs, Dissertation, Self-Study, Field work, term papers, active learning, multimedia aids, research colloquia.
 - **Experience-based Learning** : Learning by doing: Work-based Training
 - Pollution Control of Air and Water
 - Physical and chemical aspects of Leather Processing
 - Extraction of Natural Products
 - Soil Testing
 - **Co-Scholastic Learning Components:** Co-curricular activities, Games and Sports, Community outreach, field and industrial visits
 - **Evaluation** : Through continuous internal and external assessment, New innovative features added : DHAs, Weekly Class Assignments, Grading, Moderation, Remedial Teaching, Extra classes, Tutorials for Slow Learners, Online viva-voce exams of PhD through video-conferencing

3. Research, Consultancy &



**Completed
Projects:14**

**Amount –
Rs. 7.91 Crores**

**Ongoing
Projects: 10**

**Amount –
Rs. 10.19 Crores**





DST – FIST Grant:

Rs. 93 Lac
(2010-2016)

DST – FIST Grant:

Rs. 1.30 Crore
(2018-2023)

UGC – SAP Grant:

- Rs. 70 Lac + 20 Lac
(Infrastructure Grant)
(2013-2018)

• **DST-TSD**

Group:

- Rs. 79.4 Lac
(2012-2014)

Student Fellowship:

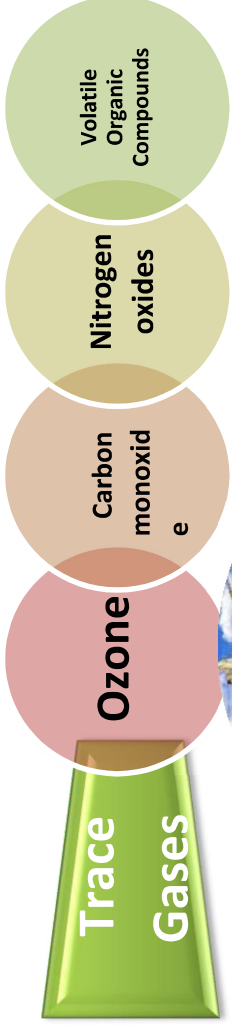
DST-INSPIRE : 4

JRF/SRF (including UGC-
BSR Fellowship): 24

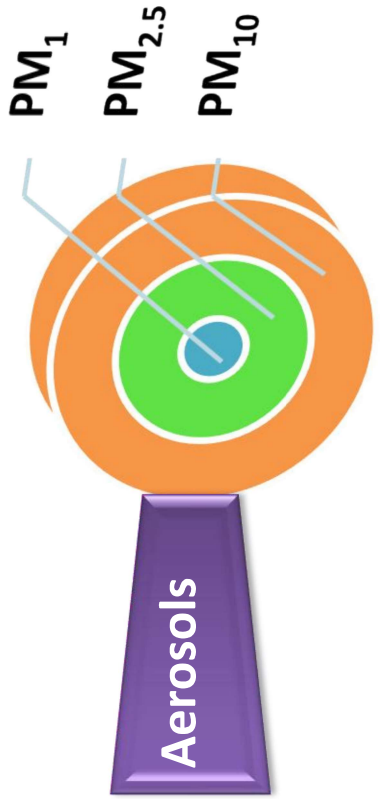
Rajiv Gandhi National
Fellowship: 2

Extra-Mural Research Projects: UGC, DST, MNRE, DAE-BRNS, DBT, CSIR,
ISRO-GBP

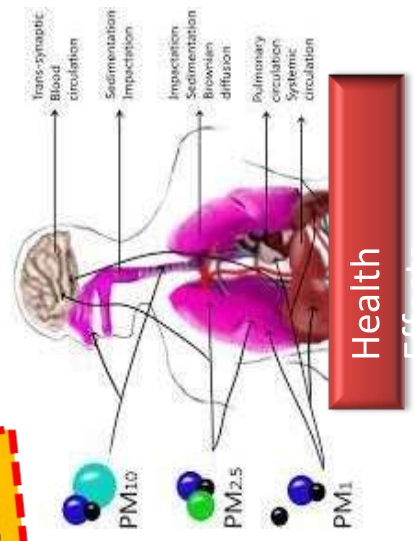
Research in Area of Atmospheric Trace Gases and Aerosols



Crop-Yield

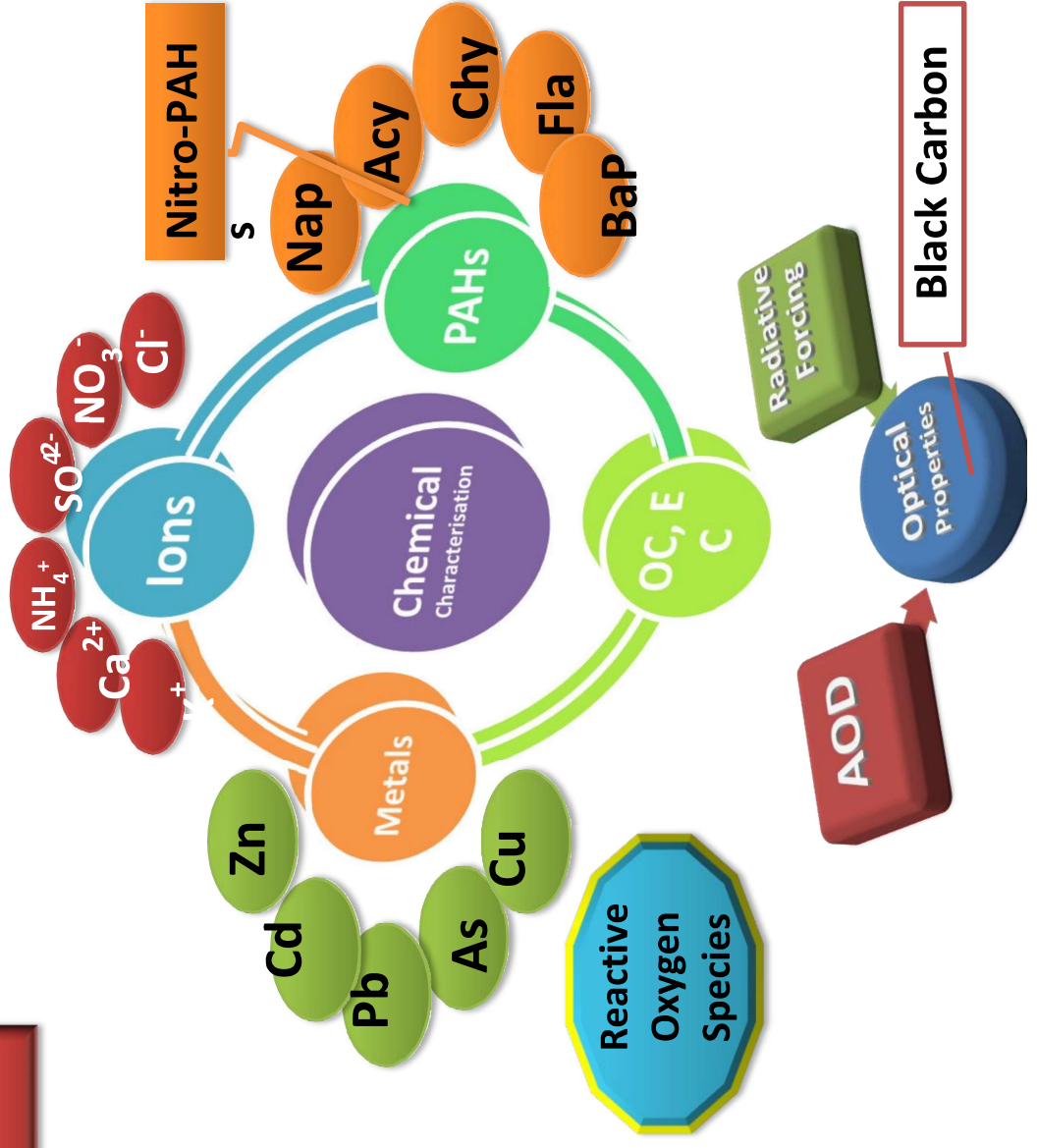


Bioaerosols

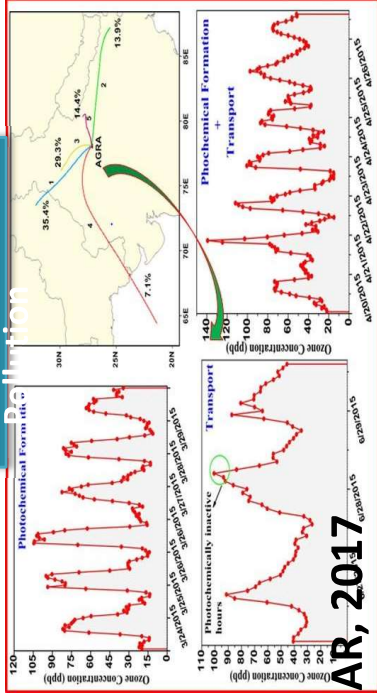


Validation of Satellite Data

Ground-Based Measurements

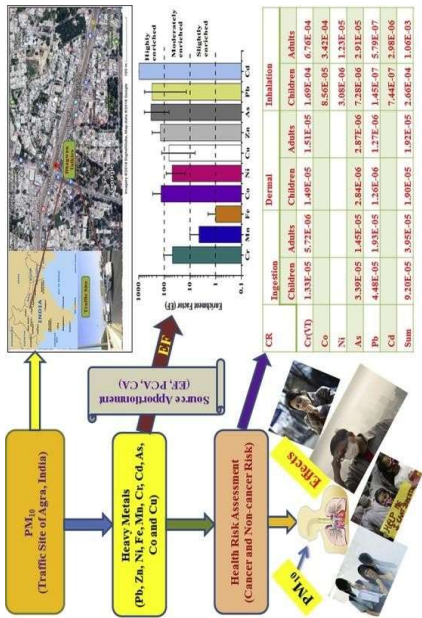


Ozone Depletion



ISRO-GBP ATCTM Project

Chemical Fractionation of Heavy Metals

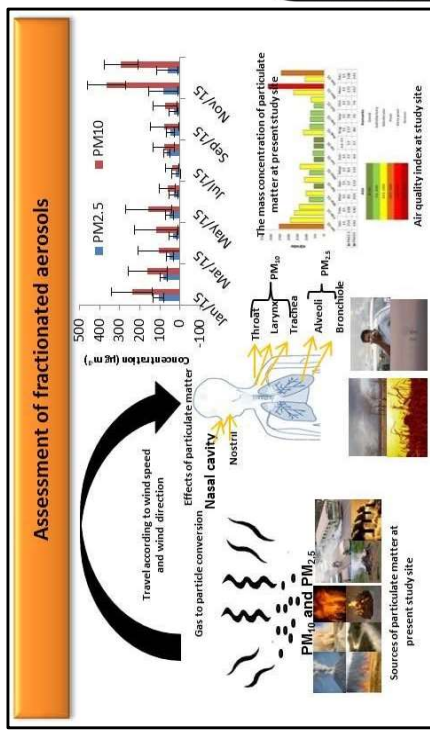


Urban Climate, 2019

Gas-Particle Partitioning of PAHs



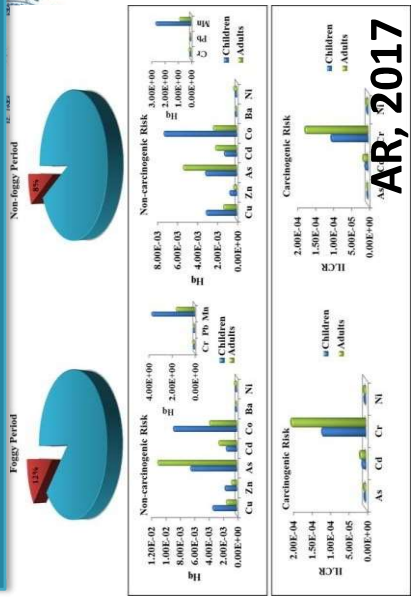
ISRO-GBP ARFi Project



Clean, 2019

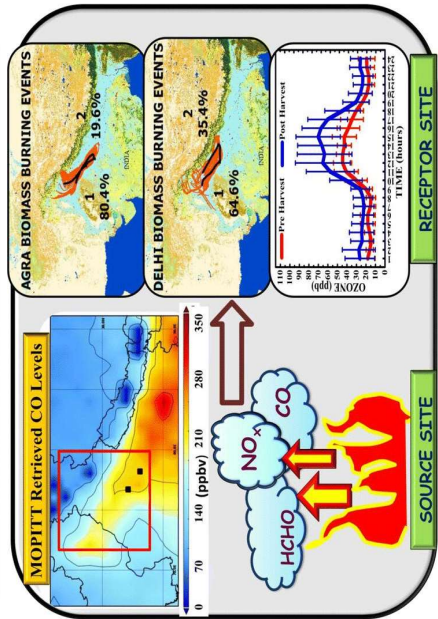
ESPR, 2018

Health Risk Assessment of Metals

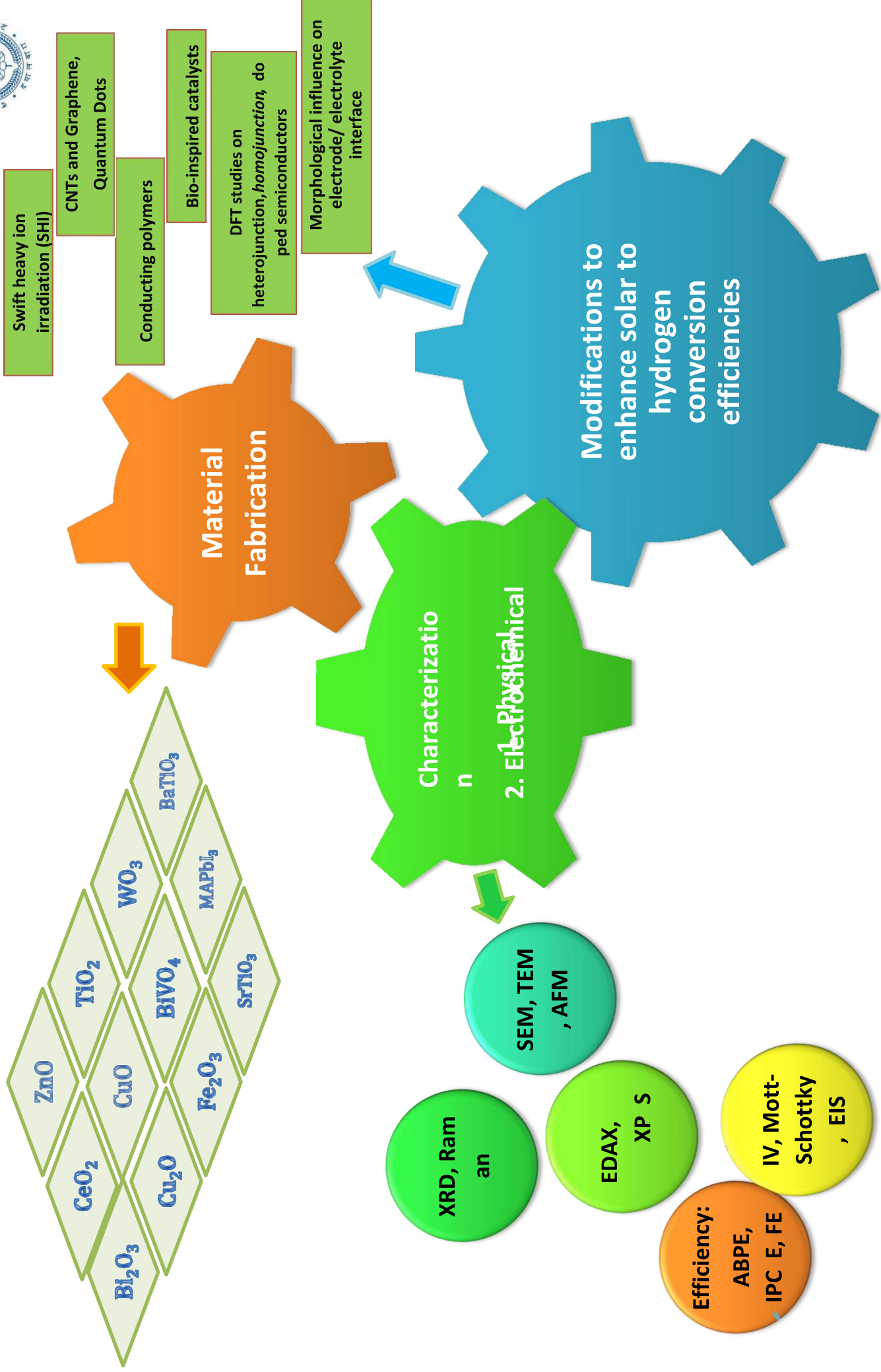


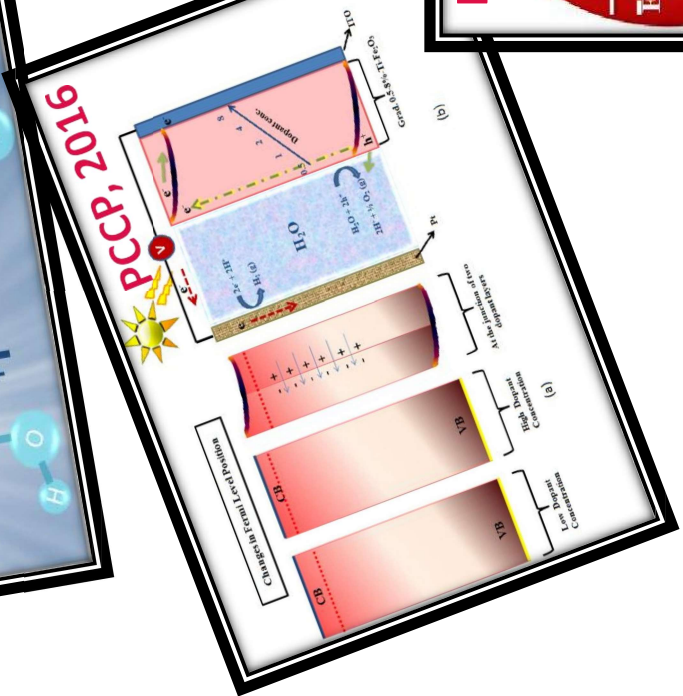
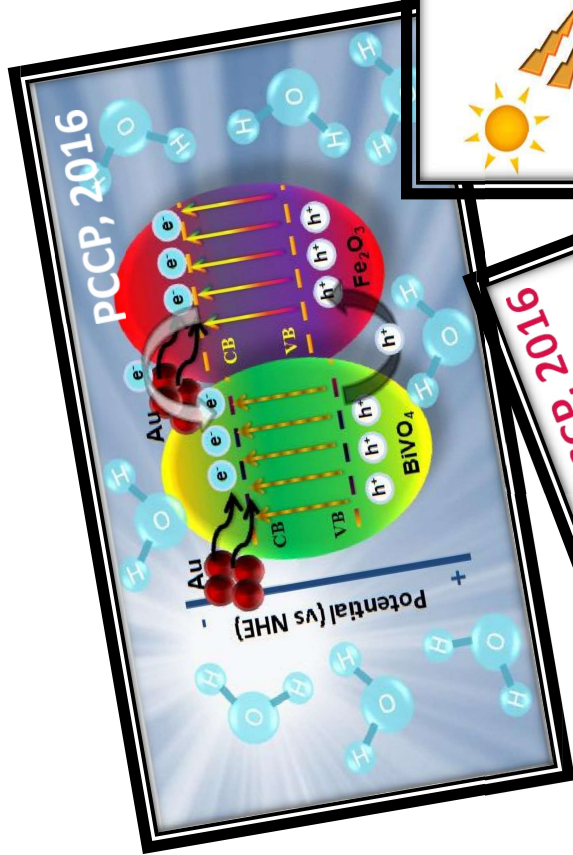
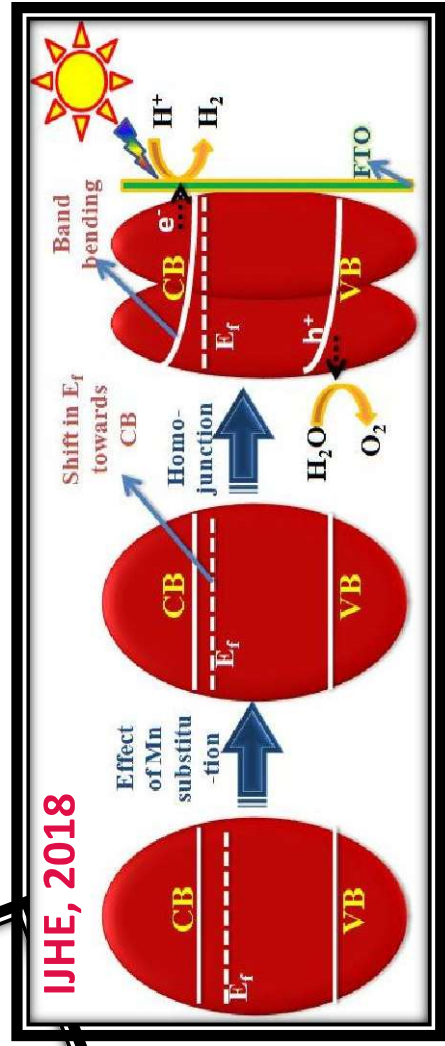
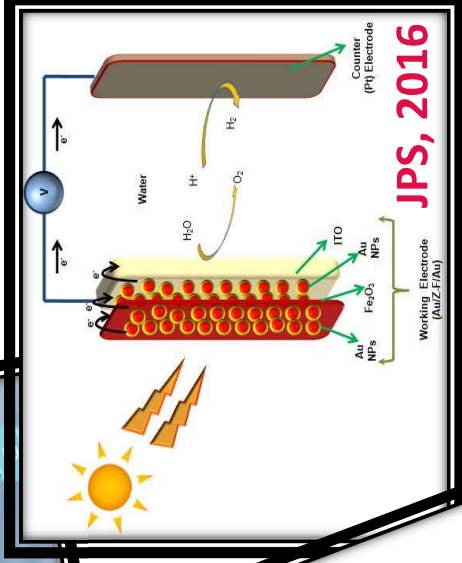
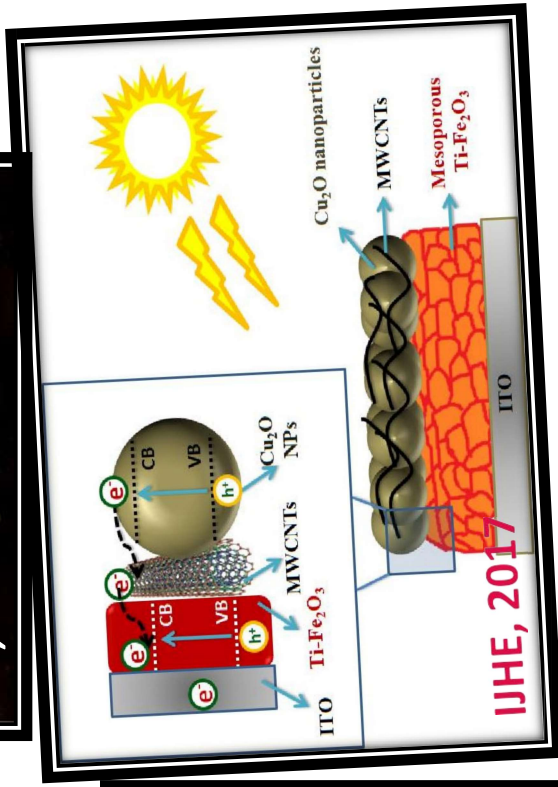
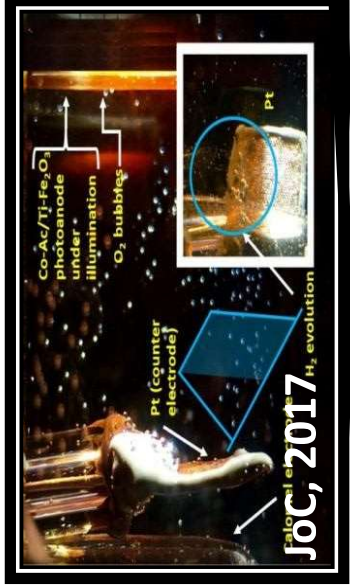
DST Projects

Influence Of Biomass Burning Activities on Ozone Levels



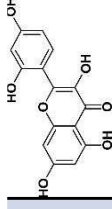
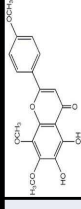

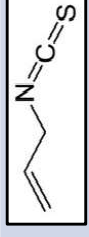
Research on Solar Hydrogen





Research Highlights: Chemistry of

Bioactive Principle of Toxic

Metals Plant	Plant parts /solvent	Explored Bio-efficacy	Bioactive principle Characterized
<i>P. amarus</i>	Root/ EtoAc	Larvicidal (12.9)	3,5,7,3',4' penta hydroxyflavone 
<i>B. Diffusa</i>	Root/ EtoAc	Antifungal (41.3)	7,5-dihydroxy iso Di methoxy iso flavone 
<i>T. Occidentalis</i>	Leaves/MeOH	Anti oxidant (10.02)	Total Phenolics
<i>E.Sativa</i>	Seeds/ EtoAc	Anticancer (24.78)	Sulforaphane 
<i>E. Sativa</i>	Seed oil	Anti oxidant (16.7)	Allyl isothiocyanate 

Enhancement in Bio-Efficacy: Green Nanotechnology

<i>M. Longifolia</i>	Aq. EtOH	Anti inflammatory Antioxidants Wound healing	
Bark	Aq. EtOH	Anti melanoma Enhancement (25%)	Total Flavonoids
Seed	Aq. EtOH AuNPs AgNPs	Anti inflammatory (% inhib.) (60.50%, 65.23%) Antioxidant (78.55%, 73.20%) Wound healing (65.10%,70.24%)	

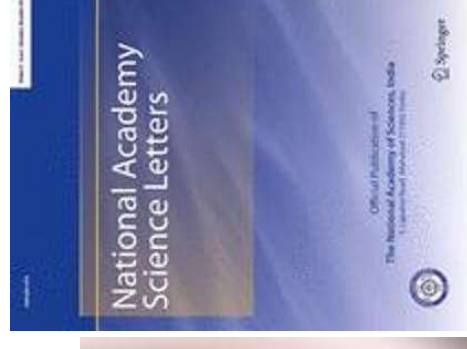
Research Highlights: Decontamination of Toxic

Functionalization & Green Nanotechnology

Native Biosorbent : Agricultural Wastes	Sorption Efficiency
Ashoka leaves	46 %
Coconut coir	48 %
Corn cob	55 %
M. Oleifera seeds	62 %
L. Leucocephala seeds	65 %

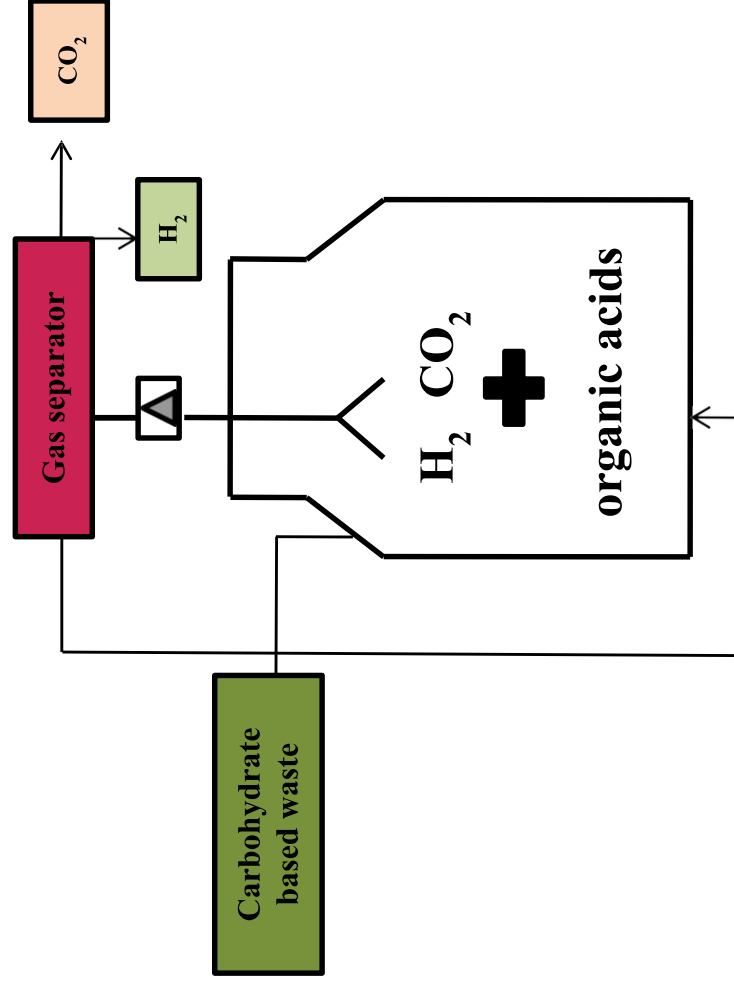
Functionalization on Nano Cellulose	Sorption Efficiency
Esterification: Succinic acid and Citric acid	90.4 %
Chelation: 2-picolylamine and 2-aminopyridine	91.0 %
Cationization: 2,3-epoxypropyl trimethyl ammonium chloride	94.2 %
Silylation : 3 amino propyl tri methoxy silane	96.5 %
Graft Polymerization : Poly anilene and Polyethylenimine	98.2 %

Major Publications:



Research Highlights: Production of Biohydrogen &

Extraction of Bioenergy in the form of: Biohydrogen, Biohythane, Bioethanol, Biomethanol from Waste



Waste Reduction + Energy Production

Major Publications □

- Kitchen waste
- Petha waste
- Dairy Wastewater
- Tannery Wastewater
- Rice straw

Pretreatment of waste/culture source methods help in deactivation of the methanogenic or hydrogen consuming bacteria which results in an increase in hydrogen produced.

Novel Green Pretreatment of Rice Straw with Petha Wastewater has been successfully initiated.



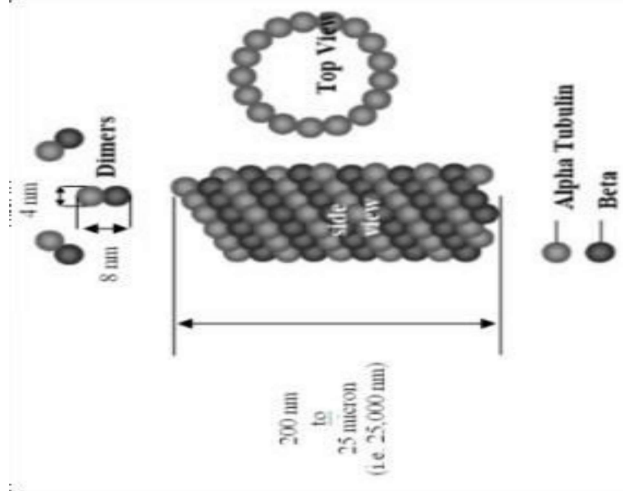
Research Highlights: Chemistry of



Spirit-mind-brain interconnection is twilight area of knowledge, undergoing fast developments with the coupling of cognitive science with brain science.

- Microtubules largest cytoskeletal filaments in cells (Diameter 25 nm). Made up of tubulin. Each tubulin subunit is made up of one alpha and one beta tubulin that are attached to each other.
- An Orch. OR qubit based on topological quantum computing specific to microtubule was suggested by Penrose and Hameroff in 2002.

□ Bandopadhyay (2011) presented experimental evidence of the theory.




- Dept. of Chemistry has initiated research in this field since 2012.
- Presented results in several international forums and Conferences (TSC).
- Published a book “Chemistry of Microtubules and Consciousness” Anal. Biochem. (2016 and 2017)



Patents Granted



भारत - 0113770
SL No. :



INTELLECTUAL PROPERTY INDIA
 GOVERNMENT OF INDIA
 THE PATENT OFFICE
 PATENT ACT, 1970 (AS AMENDED)

पेटेंट सं. / Patent No. : 360209
अर्ज़ सं. / Application No. : 20201105827
पेटेंट दिनांक / Date of Filing : 11/12/2020

पेटेंट आवेदनकर्ता / Inventor : 1. BIRWAS NEERAJ KUMAR (MR.) (RESEARCH SCHOLAR), 2. SRIVASTAV ANUPAM (DR.) (ASSISTENT PROFESSOR), 3. VERMA ANURADHA (DR.) (RESEARCH ASSOCIATE) अ. ए. ए. अ. ए. अ. ए. अ. ए.

पेटेंट का विषय / Title of Patent :

उच्चतम दक्षता के साथ हाइड्रोजन उत्पादन और उच्च क्रिस्टलिन ZnO के लिए फोटोइलेक्ट्रोकेमिकल पानी बँटव, 2020
 High efficiency hydrogen production and highly crystalline ZnO for photoelectrochemical water splitting, 2020

इस पेटेंट को अर्ज़ दिनांक 11 दिसंबर 2020 को अर्ज़ किया गया था।
 It is hereby certified that a patent has been granted to the patentee for an invention entitled HYDROGEN PRODUCTION USING HIGHLY CRYSTALLINE ZnO FOR PHOTOELECTROCHEMICAL WATER SPLITTING as disclosed in the above mentioned application for the term of 20 years from the 11th day of December 2020 in accordance with the provisions of the Patents Act, 1970.

दिनांक / Date : 26.10.2021, 06:50 AM
नियंत्रक / Controller of Patent :


शुभकामनाएँ! आपकी अत्यंत महत्वपूर्ण उपलब्धि के लिए।
 Warmest Congratulations for your significant achievement in your life. Keep it up! Achieving Dynamically!

ध्यान दें: यह पेटेंट का प्रमाण पत्र 11 दिसंबर 2020 को अर्ज़ दिनांक के लिए है।
 Note: This is a certificate of patent granted for the term of 20 years from the 11th day of December 2020 and on the same day in every year thereafter.

July 30, 2021

Partially Crystalline Nitrogen Doped Titanium Dioxide for Unbiased Photoelectrochemical Water Splitting for Hydrogen Generation

भारत - 01137990
SL No. :



INTELLECTUAL PROPERTY INDIA
 GOVERNMENT OF INDIA
 THE PATENT OFFICE
 PATENT ACT, 1970 (AS AMENDED)

पेटेंट सं. / Patent No. : 360209
अर्ज़ सं. / Application No. : 20201105827
पेटेंट दिनांक / Date of Filing : 11/12/2020

पेटेंट आवेदनकर्ता / Inventor : 1. BIRWAS NEERAJ KUMAR (MR.) (RESEARCH SCHOLAR), 2. SRIVASTAV ANUPAM (DR.) (ASSISTENT PROFESSOR), 3. VERMA ANURADHA (DR.) (RESEARCH ASSOCIATE) अ. ए. ए. अ. ए. अ. ए.

पेटेंट का विषय / Title of Patent :

हाइड्रोजन उत्पादन के लिए उच्चतम दक्षता के साथ हाइड्रोजन उत्पादन और उच्च क्रिस्टलिन ZnO के लिए फोटोइलेक्ट्रोकेमिकल पानी बँटव, 2020
 High efficiency hydrogen production and highly crystalline ZnO for photoelectrochemical water splitting, 2020

इस पेटेंट को अर्ज़ दिनांक 11 दिसंबर 2020 को अर्ज़ किया गया था।
 It is hereby certified that a patent has been granted to the patentee for an invention entitled HYDROGEN PRODUCTION USING HIGHLY CRYSTALLINE ZnO FOR PHOTOELECTROCHEMICAL WATER SPLITTING as disclosed in the above mentioned application for the term of 20 years from the 11th day of December 2020 in accordance with the provisions of the Patents Act, 1970.

दिनांक / Date : 25/10/2021
नियंत्रक / Controller of Patent :


शुभकामनाएँ! आपकी अत्यंत महत्वपूर्ण उपलब्धि के लिए।
 Warmest Congratulations for your significant achievement in your life. Keep it up! Achieving Dynamically!

ध्यान दें: यह पेटेंट का प्रमाण पत्र 11 दिसंबर 2020 को अर्ज़ दिनांक के लिए है।
 Note: This is a certificate of patent granted for the term of 20 years from the 11th day of December 2020 and on the same day in every year thereafter.

October 25, 2021

Hydrogen Production Using Highly Crystalline ZnO for Photoelectrochemical Water Splitting

भारत - 01141803
SL No. :



INTELLECTUAL PROPERTY INDIA
 GOVERNMENT OF INDIA
 THE PATENT OFFICE
 PATENT ACT, 1970 (AS AMENDED)

पेटेंट सं. / Patent No. : 360545
अर्ज़ सं. / Application No. : 20201105828
पेटेंट दिनांक / Date of Filing : 11/12/2020

पेटेंट आवेदनकर्ता / Inventor : 1. BIRWAS NEERAJ KUMAR (MR.) (RESEARCH SCHOLAR), 2. SRIVASTAV ANUPAM (DR.) (ASSISTENT PROFESSOR), 3. VERMA ANURADHA (DR.) (RESEARCH ASSOCIATE) अ. ए. ए. अ. ए. अ. ए.

पेटेंट का विषय / Title of Patent :

उच्चतम दक्षता के साथ हाइड्रोजन उत्पादन और उच्च क्रिस्टलिन ZnO के लिए फोटोइलेक्ट्रोकेमिकल पानी बँटव, 2020
 High efficiency hydrogen production and highly crystalline ZnO for photoelectrochemical water splitting, 2020

इस पेटेंट को अर्ज़ दिनांक 11 दिसंबर 2020 को अर्ज़ किया गया था।
 It is hereby certified that a patent has been granted to the patentee for an invention entitled PARTIALLY CRYSTALLINE NITROGEN DOPED ZINC OXIDE FOR UNBIASED PHOTOELECTROCHEMICAL WATER SPLITTING FOR HYDROGEN GENERATION as disclosed in the above mentioned application for the term of 20 years from the 11th day of December 2020 in accordance with the provisions of the Patents Act, 1970.

दिनांक / Date : 25/10/2022, 05:45 AM
नियंत्रक / Controller of Patent :

शुभकामनाएँ! आपकी अत्यंत महत्वपूर्ण उपलब्धि के लिए।
 Warmest Congratulations for your significant achievement in your life. Keep it up! Achieving Dynamically!

ध्यान दें: यह पेटेंट का प्रमाण पत्र 11 दिसंबर 2022 को अर्ज़ दिनांक के लिए है।
 Note: This is a certificate of patent granted for the term of 20 years from the 11th day of December 2022 and on the same day in every year thereafter.

February 22, 2022

Partially Crystalline Nitrogen Doped Zinc Oxide for Unbiased Photoelectrochemical Water Splitting for Hydrogen Generation

Patents Granted

March 8, 2018

भारत सरकार
GOVERNMENT OF INDIA
THE PATENT OFFICE
पेटेंट कार्यालय
PATENT CERTIFICATE
(Part 1 of the Patent Rules)

पेटेंट सं. / Patent No. : 293876
आवेदन सं. / Application No. : 2926/DEL/2008
फाइल करने की तारीख / Date of Filing : 24/12/2008
पेटेंटी / Patentee : DAYAL BAGH EDUCATIONAL INSTITUTE.

प्रमाणित किया जाता है कि पेटेंटी की उपासना में यथापरिचित "A PHYSICO CHEMICAL PROCESS TO ENHANCE THE SORPTION EFFICIENCY OF LEUCAENA LEUCOCEPHALA SEED POWDER(LLSP)" नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबन्धों के अनुसार आज तारीख 24th day of December 2008 से बीस वर्ष की अवधि के लिए पेटेंट अनुदान किया गया है।


It is hereby certified that a patent has been granted to the patentee for an invention entitled "A PHYSICO CHEMICAL PROCESS TO ENHANCE THE SORPTION EFFICIENCY OF LEUCAENA LEUCOCEPHALA SEED POWDER(LLSP)" as disclosed in the above mentioned application for the term of 20 years from the 24th day of December 2008 in accordance with the provisions of the Patents Act,1970.

पेटेंट कार्यालय
THE PATENT OFFICE
भारत सरकार
GOVERNMENT OF INDIA

पेटेंट सं. / Patent No. : 293876
आवेदन सं. / Application No. : 2926/DEL/2008
फाइल करने की तारीख / Date of Filing : 24/12/2008
पेटेंटी / Patentee : DAYAL BAGH EDUCATIONAL INSTITUTE.

पेटेंट सं. / Patent No. : 06/03/2018
Date of Grant

पेटेंट नियंत्रक
Controller of Patent



A Physico Chemical Process to Enhance the Sorption Efficiency of Leucaena Leucocephala Seed Powder (Ilsp)

Process for the Decontamination of Toxic Heavy Metal's Polluted Water



Research

Publications

Journal Impact Factor

Applied Catalysis B: Environmental (Elsevier)	14.22
Renewable and Sustainable Energy Reviews (Elsevier)	10.5
Journal of Catalysis (Elsevier)	7.7
Journal of Power Sources (Elsevier)	7.4
Ultrasonics Sonochemistry (Elsevier)	7.2
Sensors and Actuators B: Chemical (Elsevier)	6.3
Renewable Energy (Elsevier)	5.4
Analytica Chimica Acta (Elsevier)	5.2
Physical Chemistry and Chemical Physics (RSC)	4.4
Journal of Physical Chemistry C (ACS)	4.3
Atmospheric Research (Elsevier)	4.1
Int. J. Hydrogen Energy (Elsevier)	4.0
Atmospheric Environment (Elsevier)	4.0
Int. Journal of Renewable Energy (Elsevier)	3.5
RSC Advances (RSC)	3.0
Environmental Science and Pollution Research (Springer)	2.9
Aerosol Air Quality and Research (Springer)	2.5
	2.5
	2.5
	2.5
	2.0

Research Profile

DISTINCTIVE FUNDING

₹ 953.5 Lakh



Research Papers

475+

Book Chapters

40+

Books

10



h – Index

7 - 34

I₁₀ - Index

10 - 81

Citations

13100+

Impact Factor

0.1- 24.9

PROJECTS

50



Research

Output

- **Ph.Ds Awarded : 28**
- **Ph.Ds Enrolled : 24**
- **Patents Awarded : 1**
- **Organization of Scientific Events**
 - ✓ **SAP Seminars: 4 (2014, 2015, 2016, 2018)**
 - ✓ **Seminars from Distinguished Visiting Scientists: 20 (2013-2019)**
 - ✓ **TEQIP funded Workshop: 1 (2018)**
 - ✓ **Royal Society of Chemistry (RSC) funded Indo-UK Workshop: 1 (2018)**
 - ✓ **Indo -US Workshop-1 (2019)**



Seminar & Symposia



CHEM FRONT-31/03/2015



Board of Studies Meeting-27/02/16



UGC SAP SEMINAR-23/11/2015



Indo-US Workshop-15/06/2019



UGC SAP SEMINAR-23/11/2015



Prof. V. D. Vankar

visit-26/02/2016

Prof. A. M. Kannan

visit- 08/03/2016



MNRE visit-05/03/2016



TEQIP Workshop-05/05/2018



UGC SAP SEMINAR-

27/03/2017



Prof. A. M. Kannan

visit- 08/03/2016





ROYAL SOCIETY OF CHEMISTRY

FUNDED



British Council Researcher Links Workshop

on

Generation, Storage and Utilisation of Renewable Hydrogen: Towards Sustainable Energy
(30th Nov to 5th Dec, 2018)

Organised by:

University of Glasgow, UK

Davabhash Educational Institute, Agra

Total

Grant:

£ 31900

Prof. Duncan

Gregory



Participants
Indian: 25
UK: 15



Organisers

Prof. Duncan H.

Gregory University of

Glasgo

Prof. Valeska

Dr Paul Anderson

University of Birmingham

Dr Valeska

University of

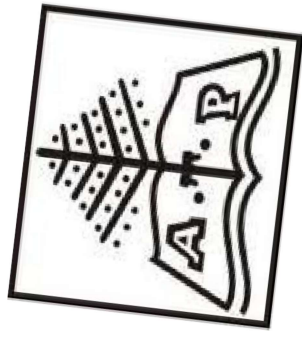
Bristol

Rohit Shrivastav from

Book & Book



ONLINE LIBRARY



Taylor & Francis Group



Collaborations – National &



Collaborative Studies

Joint Projects

Exchange Visits

Sharing Instrumentational Facilities

Thesis Supervision

Joint Publications

Lab Sharing

Upscale Hydrogen Production

Trace Gases Measurement Modelling



Physical Research Laboratory (PRL)



Indian Institute of Chemical Biology



International Collaborations -

Indo – US Project

Semiconductor chip/chiplet based novel approaches for Efficient Solar – Water Splitting: A. Photoelectrochemical Hydrogen Generation; B. Photocatalytic Hydrogen Generation

Sanctioned under:

21st Century Knowledge Initiative Scheme of UGC

Duration: 2015 – 2018

Amount sanctioned: 117 Lacs

In collaboration with:

- Prof. A.M. Kannan, Arizona State University, USA
- Prof. Keng Hsu, Arizona State University, USA



International Collaborations -

Regular Visiting



Prof. Sheryl Ehrman
University of
Maryland



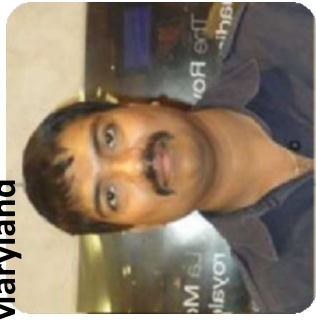
Prof. Raymond
Adomatis
University of Maryland



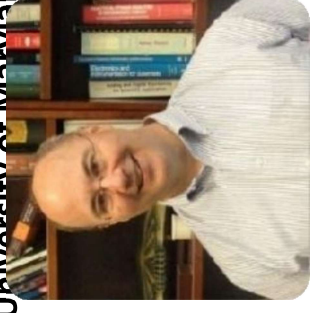
Prof. M.R. Zachariah
University of



Prof. A.M. Kannan
Arizona State



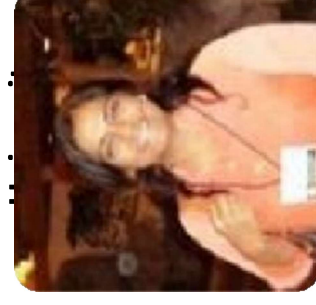
Prof. V. Rao Surisetty
Univ. of Saskatchewan,
Saskatoon Oct. 2017



James T. McLeskey Jr.
Randolph-Macon College,
VA



Prof. Shen
Zexiang NTU,
Singapore



Prof. Minu Maninder
Old Dominion University,
Virginia

February 2017:

Mr. Xuan Shi, a Research
Student from Arizona
State University, USA,
visited the Dept.

March 2016

December 2017 &

January 2019 :

Mr. Umesh Prasad, a Research
Student from Arizona State
University, USA, visited the
Dept.

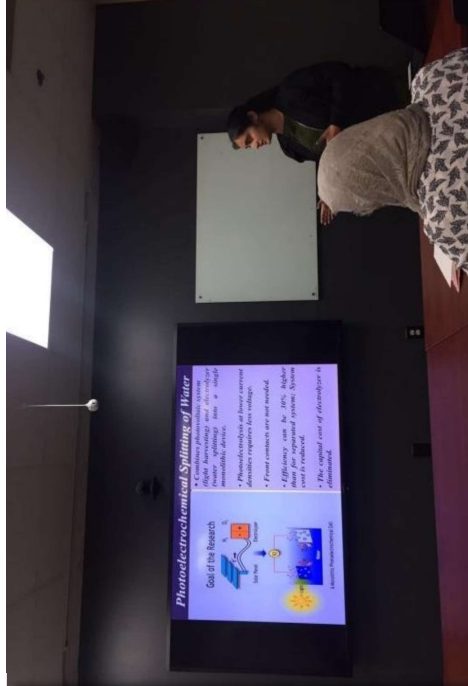
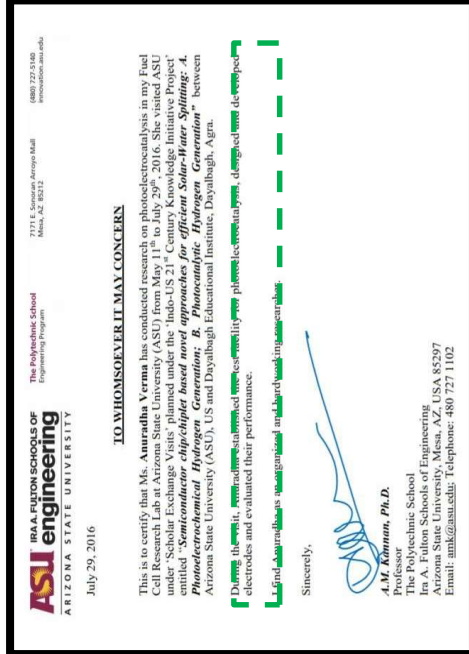


International Collaborations -



Current Research Students Visiting Abroad- Arizona State University

- 2016: Ms. Shailja Sharma and Ms. Anuradha Verma (3 Months Visit)
- 2017: Ms. Gurpreet Kaur and Ms. Anamika Banerjee (3.5 Months Visit)
- 2018: Ms. Divya and Ms. Kumari Asha (1.5 Months Visit)
- Gave Seminars at Univ. of Maryland and Stanford Univ. - Collaborations Intents Received



**PEC TEST
FACILITY
ESTABLISHMENT**
ANNA UNIVERSITY

Ms. Gurpreet Kaur

Ms. Anamika Banerjee

Research Collaborations with

MoU signed with Indian Oil Corporation Ltd. in 2014

- Collaborative Research with Indian Oil Corporation Ltd. (R & D Centre, Faridabad), on up-scaling of solar-hydrogen generation systems via photo splitting of water.

Majors Activities:

1. Lab set up for testing PEC water splitting at IOCL, Faridabad.
2. Fabrication of large area electrodes and the testing of materials for hydrogen evolution
3. Preparation of metal oxide semiconductors using ultrasonic spray pyrolysis set up at IOCL



Extension Activities

- Winter Training Camps, Science Camps (Mysuru, Ujhani)
- Water Quality Testing (Weekly)
- Testing of Water of Sewage Treatment Plant (STP) (Monthly)
- Monitoring of Air Quality Parameters and Meteorological Parameters (Daily)
- Honorary Teaching at Day Boarding School, Agra (Weekly)
- Civil Services Training Programme
- Solving local problem of Petha waste: Conversion to CLEAN ENERGY (H₂)



4. Infrastructure & Learning



s. Resource		Department/Centre/Faculty Details
1.	Library (Books, Journals (INFLIBNET))	1146 books in the departmental library
2.	Internet Facilities for staff and students	Available to all
3.	Classrooms	Shared
4.	Students' Laboratories	4
5.	Research Laboratories	4



New Equipment Added

- Diffuse Reflectance-UV Spectrometer -2018
- Zeta Sizer-2017
- GRIMM Portable Spectrometer - 2017
- Spin Coater - 2014
- Potentiostat – 2014
- Table Top SEM – 2013
- Spray Pyrolysis Unit – 2013
- Aethalometer-2013
- Multiwavelength Radiometer-2013



Table Top SEM



Zeta Sizer



Spray Pyrolysis Unit



DR-UV Spectrometer

Equipment under

- Inductively coupled plasma atomic emission spectroscopy : 40 Lacs (DST-FIST) – **INSTALLED on 24.07.19**
- Thermogravimetric Analysis (TGA) 30 Lacs (DST-FIST)
- Differential Scanning Calorimetry (DSC)
- Fluorescence Spectrophotometer : 14 Lacs (DST-SERB)
- Thermal Desorption Unit for Gas Chromatography: 40 Lacs (DST-FIST)
- Gas Chromatography-Mass Spectroscopy (GC-MS): 30 Lacs (ISRO-GBP)



5. Student Support &

Visit of students

8 October, 2014

- Inter University Accelerator Centre (IUAC) , Delhi
- Intl. Centre for Genetic Bio-technology (ICGEB), Delhi

• Intertech Pvt. Ltd., Gurgaon 17

Nov. 2015

• Sun Pharma Laboratories, Gurgaon 14

November, 2017

- Mathura Refinery
- ~~Mathura~~ ~~Refinery~~ ~~Center~~, Faridabad 12

February, 2018

- Narora Atomic Power Plant

Students after qualifying JAM, NET and GATE are pursuing PG and Ph.D. at
IISC, IIT, Delhi
Bangalore IIT, ISER, Pune
Roorkee IIT,

Eighty percent research students are on scholarships through NET, GATE, UGC-BSR and Projects



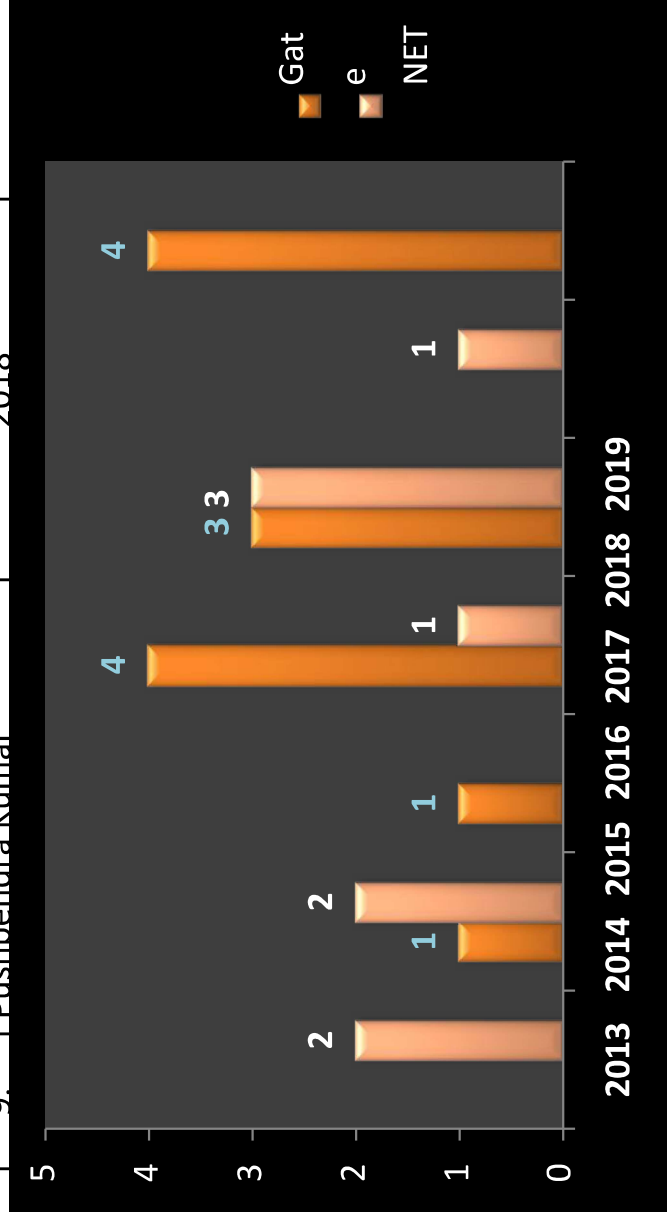
Success in National Competitive

Xams QUALIFIERS NET QUALIFIERS



S.No	Name	Year
1.	Anupam Srivastava	2014
2.	Harsha Devnani	2015
3.	Mukti Sharma	2016
4.	Shilpa Varshney	2016
5.	Chanchal Sharma	2016
6.	Awni Agarwal	2016
7.	Priyanka Sharan	2017
8.	Sakshi Agarwal	2017
9.	Ajeet Kumar Sharma	2017
10.	Anam Afaq	2019
11.	Varun Bhatnagar	2019
12.	Pushpendra Kumar	2019
13.	Soniya Singh	2019

S.No	Name	Year
1.	Priyanka Jain (LS)	2013
2.	Shilpa Varshney (JRF)	2013
3.	Anupam Srivastava	2014
4.	Mukti Sharma (LS)	2014
5.	Priyanka Sharan	2016
6.	Sakshi Agarwal	2017
7.	Meena Singh	2017
8.	Divya Yadav	2017
9.	Pushpendra Kumar	2018



6. Governance, Leadership &

Departmental Committees

- *Class Committees*
- *Proctors*
- *Programme Co-ordinators*
- *Time-Table Committee*
- *UG and PG Moderation Committees*
- *Board of Studies*
- *Examination*

Faculty are Members of Institute and Faculty Committees

- *Institute Time Table Committee*
- *Institute of Eminence*
- *Magazine Committee*
- *Examination Committee*



7. Institutional Values & Best

Innovative Practices

- Open evaluation system
- Question Banks for each Course provided
- Hand outs of important topics provided as a ready reference
- Research Colloquia held fortnightly for M. Phil, Ph.D. scholars.
- Class Committees for the students.
- Feedbacks obtained from external examiners both for theory and practical courses are sent to respective teachers for improvement.
- Feedback of RDC is incorporated by the research Scholar in his /her thesis work.
- The comments and suggestions of AAAC and NAAC are gladly accepted.

Green Practices

- Principles of Green Chemistry at UG and PG level practiced

Values

Practiced:

*Selfless Service,
Integrity,
Frugality,
Reliability,
Courage,
Dignity of
Labour,
Curiosity,
Accuracy,
Natural Spirit,
Temperance*



Future Plan of Action

Vision – 2031



S.No.	Important Milestone	Timeline	Actions Initiated
1.	Contribute in the Pollution Abatement Policies of the Country	2021	•Joining hands with Clean Air Asia Program especially on projects related to Agra
2.	Establish Centre for Advanced Study on Atmospheric Chemistry	2021	•Have established strong research base in the proposed area. •Participating actively in multi-institutional projects funded by ISRO-GBP •Successfully completed two rounds of UGC-SAP (DRS-I and II)
3.	Strengthening Industry Tie-ups and Undertake Research Problems from Industry	2022	•Entered into research collaboration with IOCL, Faridabad (MoU signed)
4.	Develop and Strengthen the MOOCs Based Chemistry Education	2022	Proposal submitted to MHRD, December 2019
5.	To Encourage Start up Initiatives in Chemical Sciences for Solving the Local Problems	2022	



**Thank
you**