Name: Dr. Manoj Pandey

Designation: Associate Professor
Department of Chemistry,
School of Technology,
Pandit Deendayal Energy University,
Knowledge Corridor, Gandhinagar.

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pandeymk1@gmail.com
Phone: +91-9978235337

PDEU PANDIT DEENDAYAL ENERGY UNIVERSITY

Formerly **Pandit Deendayal Petroleum University**

Ph.D. *(SRF, Chemistry, IIT Kanpur, 2007,* ***Supervisor:*** *Prof. Vinod K. Singh (Padma Shri), Former Director, IISER, Bhopal)*

Post-Doc. *(* IIT-Haifa, Israel, 2007, *NIT-Japan, Apr-2008-Mar-2010, Kothari fellow, HCU Sep-2010, Hyderabad)*

Associate Professor, *Dept. of Chemistry, SoT, PDEU, 2017, Assistant Professor, Science, SoT, 2010*

BRIEF BIO

Dr. Manoj Pandey, Associate Professor joined Department of Chemistry, School of Technology, Pandit Deendayal Energy University in September, 2010. His research interests mainly focus on addressing energy, environmental and health issues. His research group working on synthesis of energy harvesting materials, biosensor, supramolecular materials for bio applications, synthesis of novel adsorbents for water remediation, developing strategies for C-H activation, new synthetic methodology, and Asymmetric catalysis. Prior to joining University, he worked as postdoctoral fellow (2007-2010) from Nagoya Institute of Technology, Japan and Israel Institute of Technology (2006-2007), Haifa-Israel. He did Ph.D. from IIT Kanpur (2007) under the supervision of Padma Shri Prof. Vinod K. Singh (founder director of IISER Bhopal).

His research group is currently, working on several research project entitled ” Water Innovation Centre Training and Research, PDEU with IITM, IITH, and NCL, DST, 556.00 Lakh, ongoing, Co-PI, 2018. “

“Improving the Stability of Perovskite Solar Cells (>1000 Hrs), DST, 43.00 Lakh ongoing PI. 2020.

“Mechanochemical Approach for Perovskite Solar Cells: A way towards efficient, stable and low cost Solar cells SERB, CORE Research Grant, 36.00 Lakh, ongoing, Co-PI, 2019.

“Mechanosynthesis of Stable and Efficient 2D Perovskite Solar Cells, DST, 58.00 Lakh, ongoing, Co-PI 2019.”

“A novel nanoparticle based bioassay for sensitive detection of cancer specific proteases, SERB, DST, 64.00 Lakh completed. Co-PI 2020.”

“Synthesis of Sumanene and Corannulene derivative and its application in various fields of chemistry, DST, 18.80 Lakh, completed, PI, 2016.” etc.

He successfully completed various major and minor research projects in diverse fields and has national and International research collaborations. Prof. Manoj has published many research publications with good impact factor. Manoj Pandey has several awards to his credit “Young Scientist Award’’ under Fast track scheme from Department of Science & Technology, Award of Senior Research Fellowship by Council of Scientific and Industrial Research, 2005, New Delhi, India. He has more than 20 years of research and teaching experience in numerous topics and handled many academic and administrative responsibilities. He is also working as Schedule one auditor in Gujarat pollution control board (GPCB).

ACADEMIC QUALIFICATION

· **B.Sc., Chemistry**	Purvanchal University, Uttar Pradesh, India	1995-1998
· **MSc., Chemistry**	Purvanchal University, Uttar Pradesh, India	1998-2000
· **Ph.D., Chemistry**	Indian Institute of Technology, Kanpur	2001-2006
· **Postdoctoral research**	Technion-Israel Institute of Technology, Israel	2007-2008
· **Postdoctoral research**	Nagoya Institute of Technology, Nagoya, Japan	2008-2010

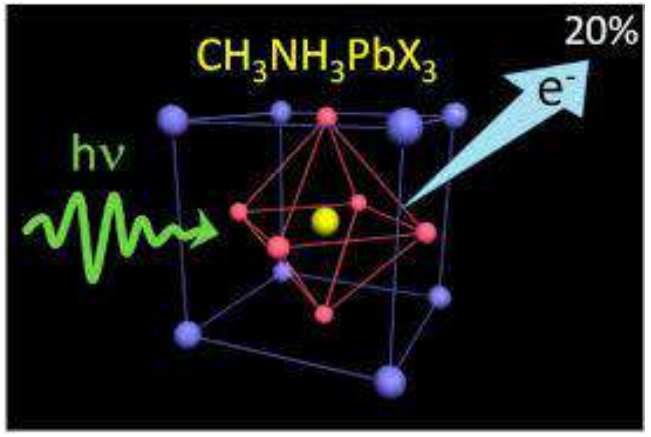
RESEARCH INTERESTS

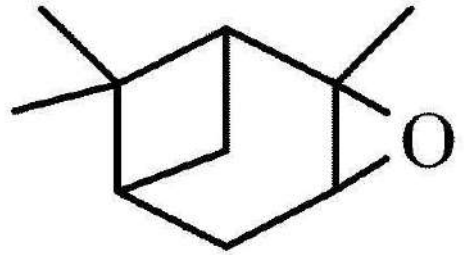
Energy, Environmental and Health:

- Energy materials
- Materials for water treatment
- Biosensor
- Novel catalyst for industrial applications
- Novel synthetic methodologies
- Supramolecular chemistry for bio application
- Novel Adsorbents material for water treatment
- Organic thin-film photovoltaic solar cell material
- Natural Product and analogues
- Asymmetric synthesis
- Synthetic methodology
- Drug design etc.

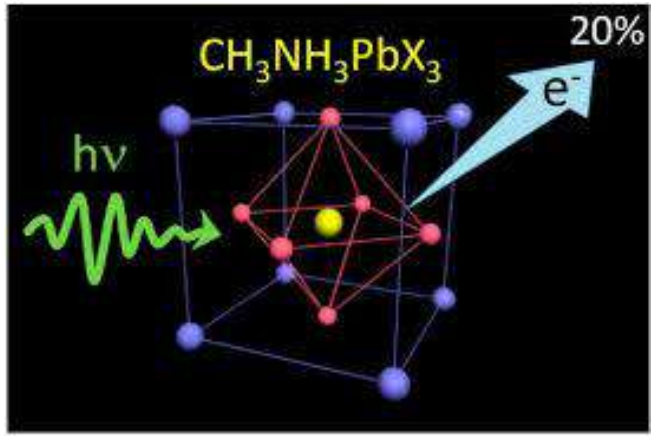
Research

Materials synthesis for Energy, Environmental, Health & Industrial Application





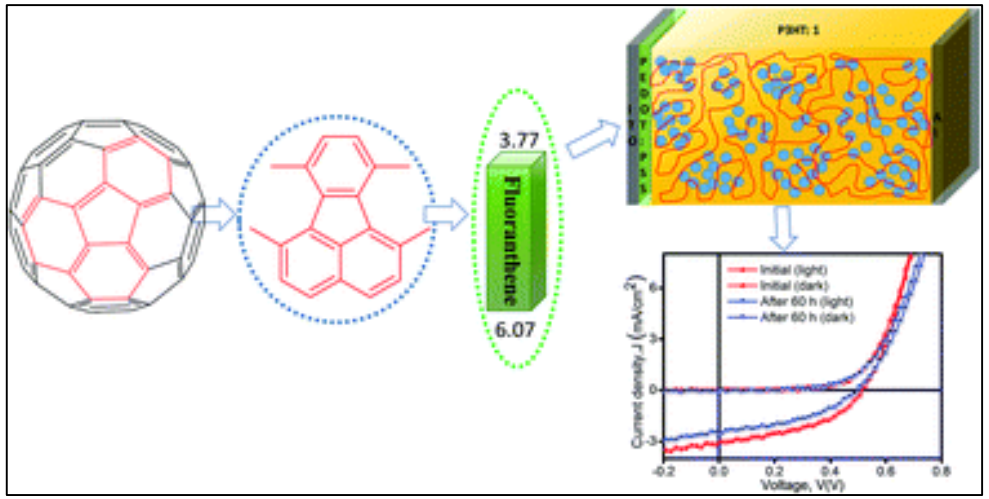
Low-cost stable Perovskite solar cell



- Perovskite and Organic Solar Cells
- Better air stable Perovskite material designed
- Studies for performance improvement
- Smallest Acceptor (Fluoranthene) designed from PCBM

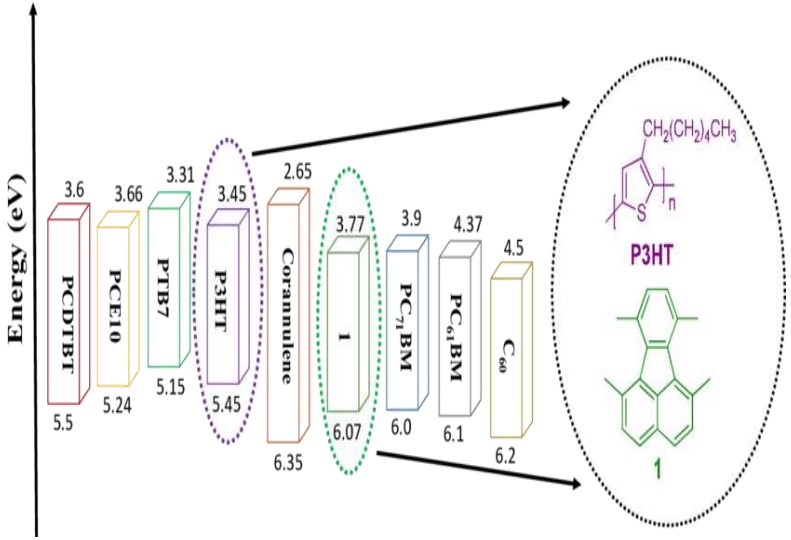
- *Solar Energy Materials and Solar Cells*, 132, pp.615-622, 2015 (**IF:4.78**)
- *Solar Energy,* 122, pp.773-782, 2015 (**IF:4.01)**
- Solar Energy Materials & Solar Cells 140 (2015) 320–327 (**IF:4.78)**
- *Materials Science and Engineering: B* 206, (2016) 22-29 (**IF:2.142)**
- Organic Electronics, 39, (2016) 258-266. (**IF:3.84)**

Smallest fullerene fragment, fluoranthene as an acceptor



Small fragment of fullerene identified as effective low cost stable acceptor for organic solar cell

This molecule stands besides PCBM, present commercially available acceptor



New J. Chem., 2017, 41, 5836--5845

Solid waste treats wastewater: ORSP Project

Waste PS is converted to PS-Sulfonate & PS-Nitrate resin then used for wastewater purification

Waste PS

Commercially valuable product

Wastewater treatment

Polystyrene

- Hazardous
- Less density
- Difficult to dispose
- Non-biodegradable
- Generated in huge qty.

Polystyrene Resins

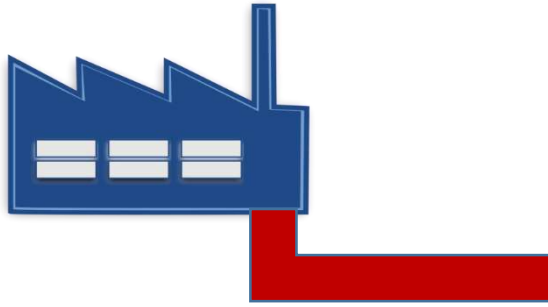
- Non-hazardous
- Low volume
- Easy to dispose
- Commercially valuable
- low cost preparation

Wastewater treatment

- Generated in huge qty and costly to treat
- PS resins can be used to remove contaminants like heavy metals and dyes

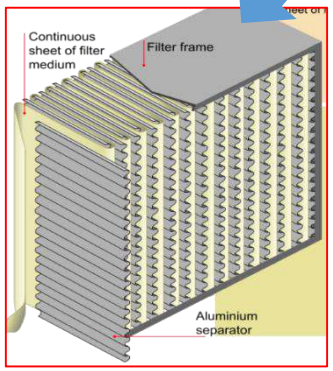
CB6-Point of use filters for industrial use

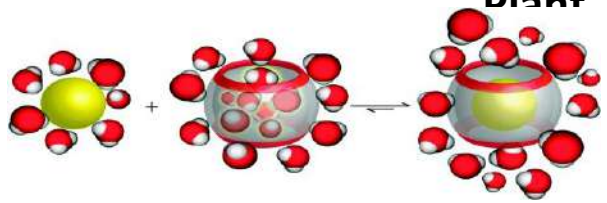
Teaching (U.G. & P.G)



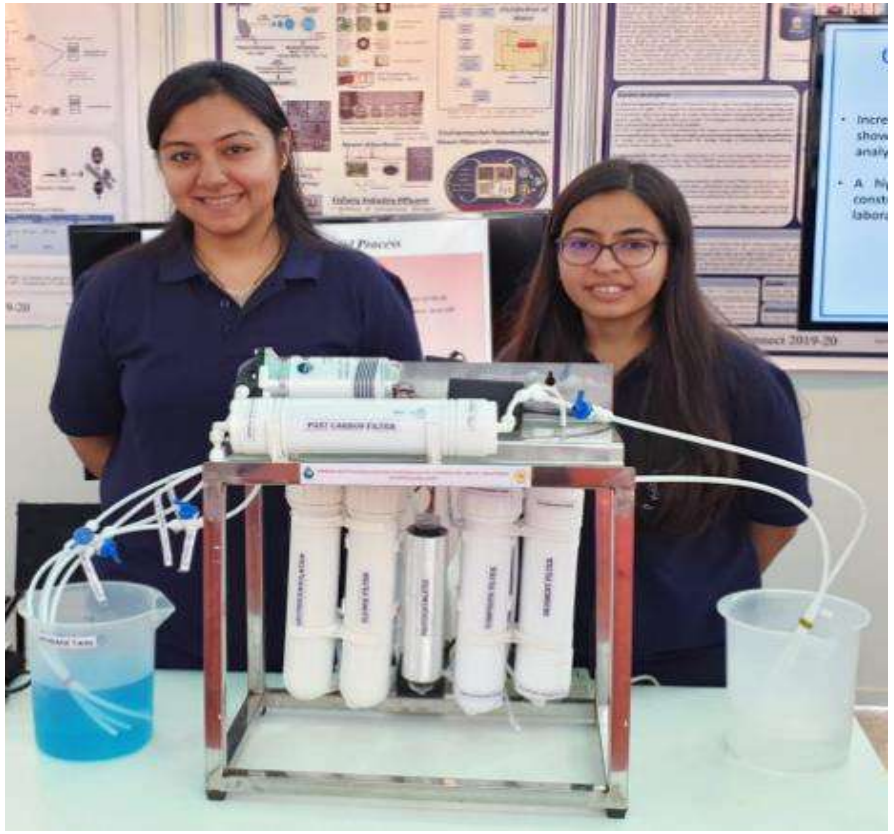
Line filters coated with Cu-CB-MMT

Product Recovery/ 2° Treatment Plant



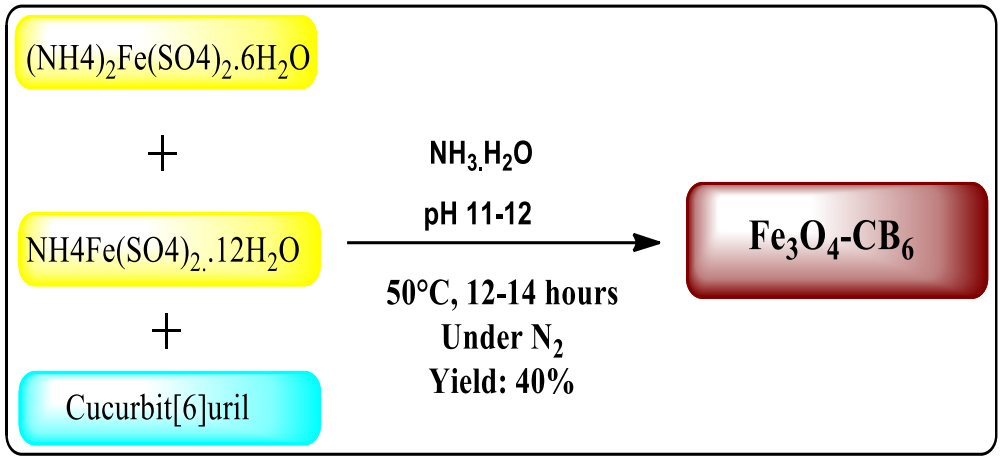


Parallel sheets of catalyst coated support material will be placed in-line of effluent

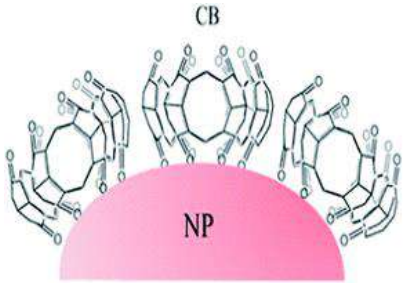


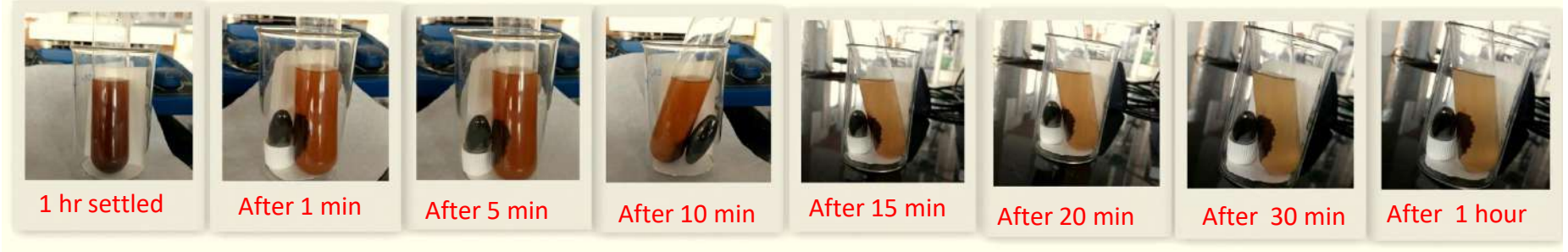
Hybrid coagulation-photocatalytic system for treatment of textile effluent (developed @ PDPU)

Fe_3O_4-CB6 Magnetic Composite



Fe-CB6 NPs in water
After reaction

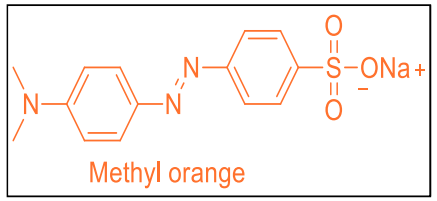




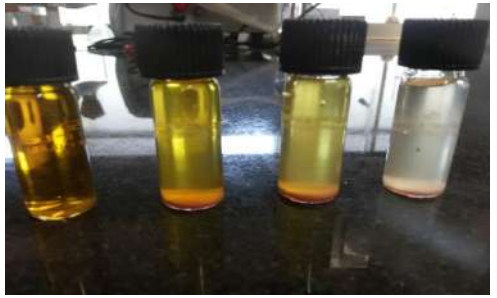
- 1.5g of CB6, 1.7g of Ferrous ammonium sulphate and 2.15g of Ferric ammonium sulphate is taken in 200ml water followed by sonication for 10 minutes
- 8 M Ammonia solution is added dropwise and heated at 50^0C for 12-14 hours. PH is maintained between 11 to12 and ppt collected using magnet

Dye removal using Silica-CB6

Absorbance + High affinity binding = Effective removal of dye



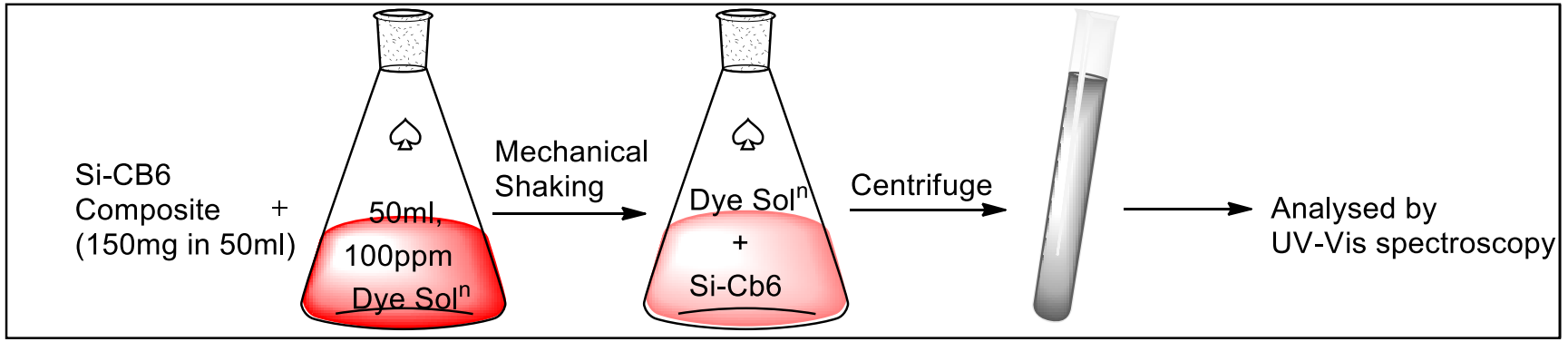
Si-CB6



MO Solutions after treatment

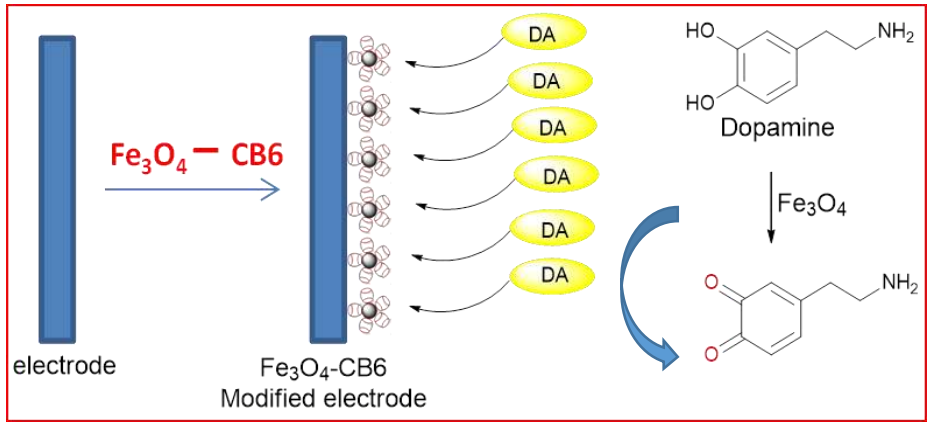
Si-CB6 regenerated

- **Silica-Cucurbituril composite was prepared and used for removal of Methyl Orange from Aqueous solutions successfully at ambient conditions at pH: 5-6**



Novel sensor platform with Host-guest binding chemistry

Bare electrode
- Less selective
- Lower binding affinity
- Weak readout



Modified electrode
- Highly selective
- Specific binding affinity
- Strong readout
- Resolved peaks

For sensing Melamine (in water, food, Milk); Bisphenol, Nitro aromatics (in water), metals (In water), Pesticides like Pendomethalin in water

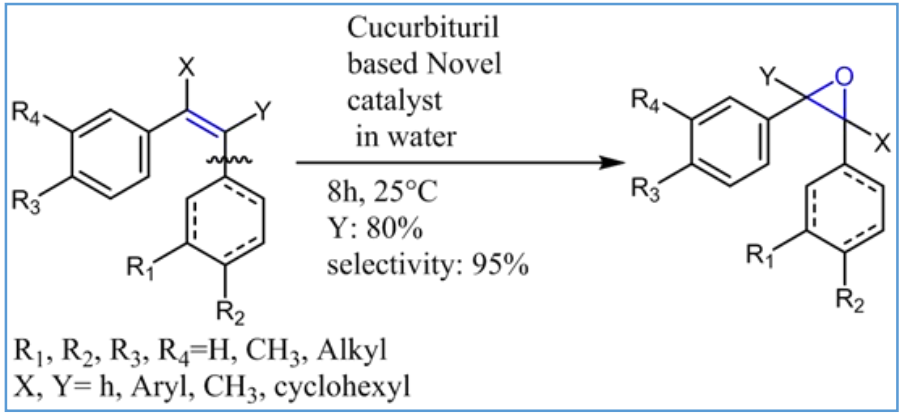
CATALYST

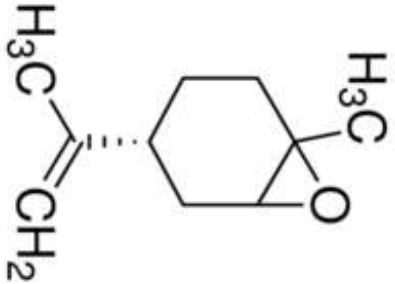
Reusable selective novel catalyst with commercial value

CATALYST

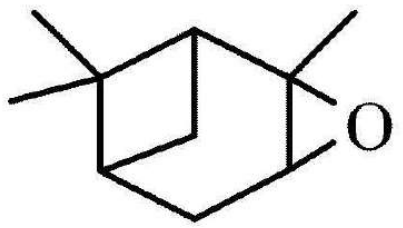
Catalyst s in organic synthesis

- Cucurbituril and Glycoluril used as green catalyst for the first time
- Commercially viable novel process developed for styrene oxide with CB6





Pinene oxide & Limonene oxide: Essential in Perfumes. Styrene oxide used in bulk polymers.



TEACHING INTERESTS

- Heterocyclic and Stereo chemistry
- Oxygen Containing Functional Groups
- Chemistry of paints and dyes
- Engineering Chemistry
- Analytical Chemistry
- Organic Chemistry
- Advanced Organic Chemistry
- Stereochemistry and Photochemistry (20MSC617T)**, M.Sc.**
- Asymmetric synthesis/catalysis (20MSC620T), **M.Sc.**
- Green Chemistry (SC 709), **Ph.D.**
- Instrumental Analytical Methods (SC 701), **Ph.D.**

Research

Research Projects (Completed-2)

Sr. No.	Faculty	Project Title	Funding Agency	PI	Co-PI	Start Month & Year	Duration (Yrs)	Completion year	**Proposed Cost** in Lakh (INR)	Remarks
1.	Dr. Manoj Pandey	Synthesis of Sumanene and Corannulene derivative and its application in various fields of chemistry	DST	PI	NA	Feb-12	3.5	2016	18.80	Completed successfully
2.	Dr. Manoj Pandey	A novel nanoparticle based bioassay for sensitive detection of cancer specific proteases	SERB	Co-PI	Dr. Nidhi Gour, Indrashil University	Mar-16	4.5	2020	64.00	Completed successfully

Research

Research Projects (Ongoing)

Sr. No.	Faculty	Project Title	Funding Agency	PI	Co-PI	Start Month & Year	Duration (Yrs)	Total **Proposed Cost** in Lakh (INR)	PDEU Share if Co-PI **Proposed Cost** in Lakh (INR)	Remarks
3.	Dr. Manoj Pandey	Water Innovation Centre Training and Research, PDEU with IITM, IITH, NCL, BARC, ONGC and TATA	DST	PI (PDEU)	Dr. Brijesh Tripathi	Sep-18	5	556.0	35.00	Ongoing Special research centre in collaboration PDEU, IITM, IITH,NCL, BARC, ONGC and TATA
4.	Dr. Manoj Pandey	Mechanochemical Approach for Perovskite Solar Cells: A way towards efficient, stable and low cost Solar cells	SERB CORE RESEARCH GRANT	Co-PI	PI-Dr. Pankaj Yadav	Jul-19	3	36.00		Ongoing
5.	Dr. Manoj Pandey	Mechanosynthesis of Stable and Efficient 2D Perovskite Solar Cells	DST	Co-PI	Dr. Pankaj Yadav	Aug-19	3	58.00		Ongoing

Research

Research Projects (Ongoing)

Sr. No.	Faculy	Project Title	Funding Agency	PI	Co-PI	Duration (Yrs)	**Proposed Cost** in Lakh (INR)	Remarks
6.	Dr. Manoj Pandey	Improving the Stability of Perovskite Solar Cells (>1000 Hrs)	DST	PI	Dr. Pankaj Yadav/Dr. Suverna	3	43.00	Accepted for funding in November, 2020

- **Patent**

  Chandra Kanth P., Maitrayee Trivedi, Manoj Kumar Pandey, "Formulation for synthesis of epoxides from olefins and process thereof". (Patent application number: 201921013586 on 4-04-2019) on 4/4/2019.

ORSP project/completed/ ongoing

S.r No.	Title	Cost in Lakh (INR)	Role	Agency	Student investigator	Status
1	Nanoparticle based photo and electrochemical Fenton active hybrid thin film electrodes for wastewater treatment	1.4	PI	ORSP,	Triparna Chakraborty, Maitrayee Trivedi and Abhishek Bhallodiya	Ongoing
2	High efficiency printable solar cells	2.45	Co-PI	ORSP	Jalaja Pandya, Bhargav Nandasana and Tirthraj	Completed
3	Perovskite photodetectors	2.00	Co-PI	ORSP	Maitrayee Trivedi	Ongoing
4	Development of new fluoranthene derivatives as non-fullerene acceptors in organic solar cell	2.00	PI	ORSP	Jessica Patel	Completed
5	Evolution of industrially emphasized synthetic methodologies using zeolites as reusable heterogeneous nano catalyst: An approach towards green chemistry	1.54	Co-PI	ORSP	Maaz Kureshi	Completed
6	Synthesis of Polystyrene resins using waste Styrofoam and its application in industrial wastewater treatment	1.9	PI	ORSP	Nishidha Dhoriya and Manav Agraval	Completed
7	Development of next generation fullerenes and their application in photovoltaics.	2.4	PI	ORSP	Krati Jain	Completed
8	Waste water treatment based on Host-guest mechanism of Cucurbiturils	2.2	PI	ORSP	Kevin Marakna and Himadri Shah	Completed
9	An approach towards green synthesis by designing novel synthetic methodologies using Copper & Iron based catalysts for dehydrogenative coupling by CH activation	2.25	PI	ORSP	Jessica Patel and Vipul Patel	Completed
10.	Synthesis and characterization of charge carrier transporting materials for enhancement of energy harvesting and their applications in devices	1.95	PI	ORSP	Maitrayee Trivedi and Parth Patel	Completed

Research Collaborations

1. Prof. Mike Serpe, University of Alberta, Canada, in field of Sensors and Water remediation (2 students gone for internship in Canada)
2. Dr. Jaffery Mativesky, Bighampton University, USA, proposed project under Indo-USA scheme by DST.
3. Dr. Christopher Collision, Rochester University, USA, proposed project under Indo-USA scheme by DST.
4. Dr. Nidhi Gaur, UIAR, Gandhinagar: Cancer diagnosis and Diabetics (DST project sanctioned)
5. IITB, Tata steel, ONGC, BARC and NCL Pune: For water innovation lab and solar research (DST Project under review)
6. Dr. Hitesh Solanki, Department of Botany, Gujarat University: Algal research Centre (Project under review at GSBTM)
7. IC-IMPACTS: A programme to provide good water and health care in India and Canada.
8. Dr. Golam Reza YazdiLinkoping University,

Industrial Collaborations:

Clearflow Inc., Canada: Strategic research collaboration in waste water treatment

Waterlutions Inc. : As recourse person through ICIMPACTS, Canada

Shyam Chemicals: Ankleshwar, Gujarat, given project to solve crystanility issue of dye

Research publication past 3 years

1. Photo-induced characteristic study of smallest fullerene fragment, 1, 6, 7, 10-tetramethylfluoranthene as an acceptor Chandra kanth p., Patel, J., Chauhan, M., Yusuf, A., Trivedi, M., Tripathi, B., Tiwari, J.P., Gupta, G., Kumar, M. and **Pandey, M.K.,** 2017.. ***New J. Chem.***, 2017,**41**, 5836-5845.
2. "Amyloid-like Structures Formed by Single Amino Acid Self-Assemblies of Cysteine and Methionine.“ Gour, Nidhi, Chandra Kanth P, Bharti Koshti, Vivekshinh Kshtriya, Dhruvi Shah, Sunita Patel, Reena Agrawal-Rajput, and **Manoj K. Pandey**. *ACS chemical neuroscience* 10, no. 3 (2018): 1230-1239.
3. Investigating the influence of charge transport on the performance of PTB7:PC71B based organic solar cells

   Mihirsinh Chauhan, Abhishek Sharma, Jessica Patel, M. Aatif, Suresh Chand**, Manoj Kumar Pandey**,

   Manoj Kumar, J. P. Tiwari and Brijesh Tripathi Phys. Chem. Chem. Phys., 20, 17304--17312 June 2018, Impact Factor- 4.4
4. Understanding charge carrier dynamics in a P3HT:FLR blend. Jessica Patel, Abhishek Sharma, Mihirsinh Chauhan, M. Aatif, Nikita Vashistha,

   Mahesh Kumar, Brijesh Tripathi, Suresh Chand, J. P. Tiwari and **Manoj Kumar Pandey,** Phys. Chem. Chem. Phys., 21, 2771-2782

   January 2019, Impact Factor- 4.4
5. Zinc oxide nanorod clusters deposited seaweed cellulose sheet for antimicrobial activity; Priyank L. Bhutiya, Mayur S. Mahajan b M. Abdul Rasheed

   b Manoj Pandey a S. Zaheer Hasan b Nirendra Misra,

   International Journal of Biological Macromolecules 112 (2018) 1264–1271, Impact factor 3.9
6. "Cucurbit [6] uril Glued Magnetic Clay Hybrid as a Catalyst for Nitrophenol Reduction Trivedi, Maitrayee U., Chandra Kanth P.,

   Nirendra M. Misra, and **Manoj Kumar Pandey**.." *Catalysis Letters* (2019): 1-13.Imact factor 2.91

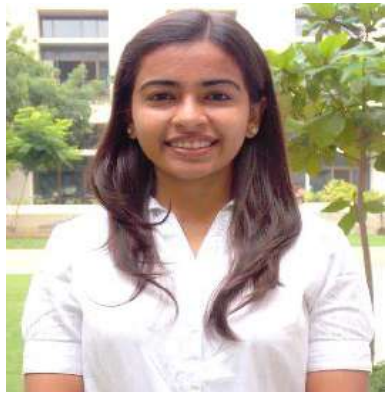
7. Identification of defects and defect energy distribution in the perovskite layer of MAPbI3−xClx perovskite solar cell; Abul Kalam1,2, Abdullah G Al-Sehemi1,2, Apurba Mahapatra3, Deepak Verma4, Suverna Trivedi5,7 and Manoj Kumar Pandey 6,7Materials Research Express (Aug, 2019) Volume 6, Page number 10
8. Graphene oxide-molybdenum oxide composite with improved hole transport in bulk heterojunction solar cells'Md. Aatif , Jessica Patel , Abhishek Sharma, Mihirsinh Chauhan, Gaurav Kumar, Prabir Pal , Suresh Chand, Brijesh Tripathi , Manoj Kumar Pandey, and J. P. Tiwari AIP Advances 9, 075215 (2019); doi: 10.1063/1.5095702
9. 'Current Scenario of Corona virus pandemic'; Anshuman Mishra, Santanu Patra, Sudhesh K Shukla, Pawan Pandey, Yogesh Shukla, Pavel Osmera, Pankaj Yadav, Manoj Pandey, Rajiv Gupta, Franck Molina, Carlos E Semino, Ashutosh Tiwari Advanced Material Letters, 2020 11(4), 20041494
10. "Reducing ion migration in methylammonium lead tri-bromide single crystal via lead sulfate passivation" Apurba Mahapatra, Nishi Parikh, Hemant Kumari, **Manoj Kumar Pandey**, Manoj Kumar, Daniel Prochowicz, Abul Kalam, Mohammad Mahdi Tavakoli and Pankaj Yadav Journal of Applied Physics 127, 185501 (2020);
11. Study of Cucurbit[7]uril nanocoating on epitaxial graphene to design a versatile sensing platform Maitrayee U. Trivedi a , b , Grzegorz Greczynski a , Chandra Kanth P. b , Manoj Kumar Pandey b , ∗ , Ivan G. Ivanov a , M. Syväjärvi a , G. Reza Yazdi a , ∗Applied Surface Science, pp. 150096, Oct 2021
12. Temperature induced structural, electrical and optical changes in solution processed perovskite material: Application in photovoltaics; Tripathi, B., Bhatt, P., Kanth, P.C., Yadav, P., Desai, B., Pandey, M.K. and Kumar, M., Solar Energy Materials and Solar Cells,. 2015, 132, pp.615-622 doi:10.1016/j.Solmat.2014.10.2017 (Listed in Most downloaded articles of this journal, Impact factor-5.75) 2.
13. Fabrication of janus type bi-layer polymeric membranes for advance water purification', materials today proceedings, pp. 1, Jan, 2021
14. 'Cucurbituril-Functionalized Nanocomposite as a Promising Industrial Adsorbent for Rapid Cationic Dye Removal', ACS Omega, pp. 3024–3036, jan 2021
15. 'Role of spacer cation on the growth and Crystal Orientation of Two-Dimensional Perovskite', Sustainable energy and fuels, pp. -, jan 2021
16. 'Recent Progress in Growth of Single-Crystal Perovskites for Photovoltaic Applications', ACS Omega, pp. -, Dec 2020

Conference & presentations:

- Khushali Patel, Ajaysinh Rajput, Harsh Ramani, Maitrayee Trivedi, Chandra Kanth P., Manoj Kumar Pandey. Removal of dyes using passive gravitational filters loaded with magnetic clay nanoparticles at 2nd International Conference on Chemical Industry, (ICCI, 2017), PDPU, Gandhinagar, India
- Jessica Patel, Mihirsinh Chauhan, Chandra Kanth. P, Maitrayee Trivedi, Vaibhav Rao, Brijesh Tripathi, Manoj Kumar, Manoj Kumar Pandey. Regulating the optical, electrochemical and morphological parameters of Fluoranthene and [3HT blend by N,Ndimethylacetamide at Open readings 2017, Vilnius, Europe
- Chandra Kanth P., Maitrayee Trivedi, Manoj Kumar Pandey. “Sonochemical synthesis of Clay-Cucurbit[6]uril-copper ferrite nanocomposite for catalytic applications” at Nanomaterials for energy conversion and storage applications (NESCA-2018), PDPU, Gandhinagar, India
- M. Agarwal, Kanth P.C, M. Trivedi, M. Pandey, N. Misra. Green synthesis of Glycolurils using natural acid as an alternative to solvent and catalyst at Chemcys-2018, Blankenberge (Belgium), Europe.
- N. Dhoriya, Chandra Kanth P, Maitrayee Trivedi, M. Pandey, N. Misra. Polystyrene Sulfonate derived from waste Styrofoam as an efficient catalyst for Glycolurils synthesis at Chemcys, 2018, Blankenberge (Belgium), Europe
- Invited talk titled "Understanding the charge transport behavior in P3HT:FLR blend” at international conference on material research and nanotechnology (ICMRN 2019) held during June 10-12, 2019 at Rome, Italy.

Ph.D. Students Graduated & Under process

Chandrakanth , Ph.D, 2019
Development of novel methodologies for functional materials & applications in energy harvesting (Pervoskite solar cells)



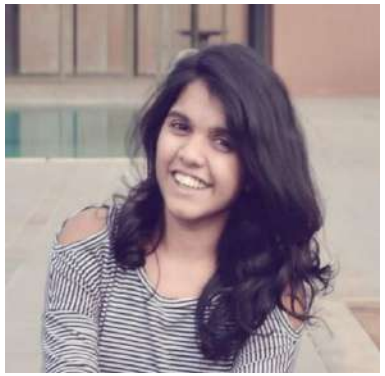
Maitrayee Trivedi, Ph.D, 2020
Host Guest Chemistry Of Cucurbituril: Synthesis and its Applications

Jessica Patel, Ph.D, 2019
Synthesis and applications of polyarenes in optoelectronic devices

Maaz Kureshi
Designing methodologies for heterocyclic compounds and their screen in biological applications

Triparna Chakraborty
(Ph.D, - Joined 2019)
Synthesis of Novel material for Water and Health applications.

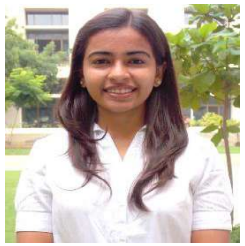
Nishi Parikh
(Ph.D. –Joined 2019)
Development of new material for sensing and photovoltaic application



Aayushi Joshi,
(Ph.D, - Joined 2020)
Design and synthesis of Novel sensing material.

Parth Kumar Sevak
(Ph.D. –Joined 2021)
Synthesis and evaluation of novel heterocyclic compounds for biologically active molecules

Students Graduated & worked under SRP project




Student investigator – Maitrayee Trivedi and Parth Patel
Project Title – Synthesis and characterization of charge carrier transporting materials for enhancement of energy harvesting and their applications in devices
MSc Batch – 2013-2015


Student investigator – Jessica Patel and Vipul Patel
Project Title – An approach towards green synthesis by designing novel synthetic methodologies using copper and iron based catalysts for dehydrogenative coupling by CH activation
MSc Chemistry Batch – 2013-2015

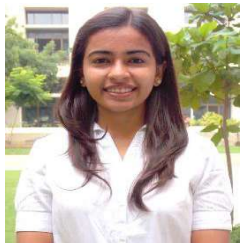
Student investigator : Kevin Marakna and Himadri Shah
Project Title: Waste water treatment based on host-guest chemistry of cucurbiturils
Batch Chemical engineering : 2015-2019

Student investigator: Krati Jain
Project Title: Development of next generation fullerenes and their applications in photovoltaics
Btech Chemical engineering: 2015-2019


Student investigator: Nishidha Dhoriya and Manav Agraval
Project Title: Synthesis of Polystyrene resins using waste styrofoam and its application in wastewater treatment
Btech Chemical engineering: 2015-2019

Student investigator: Maaz Kureshi and Shubham
Project Title: Evolution of industrially emphasized synthetic methodologies using zeolites as reusable heterogeneous nano catalyst: An approach towards green chemistry

Students Graduated & worked under SRP project


Student investigator – Triparna Chakraborty (PhD), Maitrayee Trivedi (PhD) and Abhishek Bhalodiya (Bsc)
Project Title - Nanoparticle based photo and electrochemical Fenton active hybrid thin film electrodes for wastewater treatment



Student investigator: Jalaja Bhadreshkumar Pandya (Phd), Bhargav Nanjibhai Nandasana and Tirthraj Kalyansinh Raulji
Project Title: High efficiency printable solar cells
Branch And Batch: B.Sc (Hons.) in Chemistry & 17th batch