

## LIST OF PUBLICATIONS

### Patents:

- 1. Carbon Molecular Sieve Membrane (CMSM) Performance Tuning By Dual Temperature Secondary Oxygen Doping (DTSOD)**  
Inventors: **Rachana Kumar**, William J Koros  
US Patent App. 13/906,143, 2013
- 2. Title: Cost effective and Eco-friendly Process for the synthesis of [6,6]-phenyl-C61-butyric acid pentyl ester (PC61BP) under aerobic conditions**  
Inventors: **Rachana Kumar**, Samya Naqvi, Neha Gupta, Suresh Chand  
US Patent US20160237018 A1  
**Application number** US 15/047,342  
**Publication date** Aug 18, 2016  
**Filing date** Feb 18, 2016
- 3. Title: A process for electrochemical deposition of PEDOT as HTL useful in organic solar cells**  
Inventors: Asit Patra, **Rachana Kumar**, V. Agrawal, R. Bhargav, Shahjad, D. Bhardwaj, R. K. Singh, S. Chand  
Patent Application No. 201611027796  
Application filing date : 23/02/2016  
Publication date : 23/02/2018
- 4. Title: Ionic-asymmetric aliphatic diamine terminated rylene dicarboximide organic electronic materials**  
Inventors: **Rachana Kumar**, Samya Naqvi, Mehak Ahuja, Komal Bhardwaj, Rajiv Kumar Singh, Asit Patra, Sushil Kumar  
Status: Patent submitted to Indian patent office (Appl. No. 202211050720; 0137NF2022 Date of filing 02/09/2022)

### Book:

- Chapter: “**Advanced Materials for Strategic and Societal Applications**”, Metrology for Inclusive Growth of India, Springer Nature, 2020. ISBN 978-981-15-8872-3
- Chapter: **Rachana Kumar** & Neelam Kumari entitled “**Novel fluorene based n-type semiconductor materials for organic electronic applications**” ISBN 978-620-0-78765-1 Lambert Academic Publishing, 2020.
- Book** by **Rachana Kumar** and Pramod Kumar entitled "Preparation of Graphene Oxide from Tattered Graphite and Applications" ISBN 978-3- 330-00286-9 LAP LAMBERT Academic Publishing GmbH & Co., Germany, 2016.
- Chapter:** T. H. Goswami, **Rachana Kumar** in “Fullerene Research Advances”, ed. Carl N. Kramer, NOVA Science Publishers, NY, 2007, Ch. 3 pages 55-96; entitled “**Recent Development of Fullerenol Research**” (ISBN: 1-60021-824-5).

### SCI Journals

- Perylene dimide incorporated activated carbon as a composite electrode for asymmetric supercapacitor. Prashant Dubey, Komal Bhardwaj, **Rachana Kumar**, Shashank Sundriya, Priyanka H. Maheshwari, **Journal of Energy Storage, 2022, 56, Part B, 106058. (IF: 8.9)**
- Perylenediimide derivatives with branched imide substituents: aggregation behaviour and impact on photovoltaic properties  
Komal Bhardwaj, Samya Naqvi and Rachana Kumar\*

- Solar Energy**, 2022, 246, 320-330. (IF: 7.2)
3. Tuning of energy levels, transport properties and device performance of naphthalenediimide derivatives by introduction of Michael addition reaction  
Mehak Ahuja, Saurabh Kumar Saini, Neeraj Chaudhary, Mahesh Kumar, Rajiv K. Singh and **Rachana Kumar\***  
**New J. Chem.**, 2022, 46, 15392 – 15404. <https://doi.org/10.1039/D2NJ01979E> (IF 3.9)
  4. Efficiency measurement of organic solar cells : Step by step protocol to be followed  
Mehak Ahuja, Samya Naqvi, Amit Kumar, **Rachana Kumar\*** Rajiv K. Singh, Sushil Kumar MAPAN, 2022, 37, 311-318. <https://doi.org/10.1007/s12647-021-00522-5> (IF 1.5)
  5. Lab on a strip chemical sensor: Reversible visual absorption sensor for detection of acids using naphthalenediimide derivative  
Mehak Ahuja and **Rachana Kumar\***  
**IEEE Sensors**, 2022, 22, 12530 – 12538. <https://doi.org/10.1109/JSEN.2022.3175503> (IF: 4.3)
  6. Influence of fluoride anion on photoinduced charge transfer interactions in adenine-functionalized push-pull naphthalene diimide chromophores  
Shailesh S. Birajdar, Mehak Ahuja, Avinash L. Puyad, Mahesh Kumar, Vishal G. More, **Rachana Kumar\***, Sidhanath V. Bhosale\* and Sheshanath V. Bhosale\*  
**Mater. Adv.**, 2022, 3, 4659-4666. <https://doi.org/10.1039/D2MA00030J>
  7. Charge transfer induced symmetry breaking in GaN/Bi2Se3 topological heterostructure device  
F. Ahmed, **R. Kumar\***, S. S. Kushvaha, M. Kumar, P. Kumar\*  
**NPJ 2D Materials and Applications**, (IF 11.4) 6, 12 (2022). <https://doi.org/10.1038/s41699-022-00288-7>
  8. An efficient electron transport properties of fullerene functionalized with tricyanovinylidihydrofuran (TCF)  
S. S. Birajdar, K. Bhardwaj, **Rachana Kumar\***, M. Kobaisi, S. V. Bhosale,\* S. V. Bhosale\*  
**Materials Research Bulletin**, 2022, 147, 111644 (IF 5.6) [10.1016/j.materresbull.2021.111644](https://doi.org/10.1016/j.materresbull.2021.111644)
  9. Saturated and unsaturated aliphatic side chain-appended naphthalenediimide derivatives: synthesis and structure property relationship.  
Mehak Ahuja, Neelam Kumari, Samya Naqvi and **Rachana Kumar\***  
**J. Mater. Sci.**, 56, 18327–18340 (2021). <https://doi.org/10.1007/s10853-021-06502-z> (IF 4.6)
  10. Solid-state synthesis of conjugated doped poly(3,4-ethylenedioxythiophene): An effective adsorbent for selective anionic dye removal.  
Sonal Gupta, Anamika Mishra, **Rachana Kumar**, Asit Patra  
**Reactive and Functional Polymers**, 2021, 165, 104972. (IF 4.9)
  11. Comparative study of aliphatic vs. aromatic substituted perylenediimide as electron transport layer material  
Komal Bhardwaj, Samya Naqvi and Rachana Kumar\*  
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  12. Influences of the number of 2-ethylhexylamine chain substituents on electron transport characteristics of core-substituted naphthalene diimide analogues.  
S. S. Birajdar, S. Naqvi, K. S. More, A. L. Puyad, **Rachana Kumar\***, S. V. Bhosale.\* S. V. Bhosale\*  
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  13. Facile h-MoO3 synthesis for NH3 gas sensing application at moderate operating temperature  
S. Kumar, A. Singh, R. Singh, S. Singh, P. Kumar, **Rachana Kumar\***  
**Sensors and Actuators B Chemical**, 2020, 325, 128974. (IF : 9.2)
  14. Flexible perylenediimide(PDI)/GaN organic-inorganic hybrid system with exciting optical and interfacial properties  
**Rachana Kumar\*** et. al.,  
**Scientific Reports**, 2020, 10, 10480. (IF : 5)
  15. Synthesis of graphene oxide with a lower band gap and study of charge transfer interactions with perylenediimide. **Rachana Kumar\*** et. al.,  
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  16. Facile synthesis of naphthalene diimide (NDI) derivatives: Aggregation induced emission, photophysical and transport properties  
Neelam Kumari, Samya Naqvi and **Rachana Kumar\***  
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  17. Synthesis and comparative charge transfer studies in porphyrin–fullerene dyads: Substituents effect  
Neha Gupta, Nikita Vasishtha, Mahesh kumar and **Rachana Kumar\***  
**J. Nano Sci. Nanotech.**, 2020, 20, 3437-3447 (IF : 1.3)
  18. Electron Transport and Ultrafast Spectroscopic Studies of New Methanofullerenes bearing Heteroatom  
Samya Naqvi, Nikita Vasishtha, Mahesh kumar and **Rachana Kumar\***  
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  19. Facile synthesis and evaluation of electron transport and photophysical properties of photoluminescent PDI derivatives

- Samya Naqvi, Mahesh Kumar and **Rachana Kumar\***  
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20. Highly permeable carbon molecular sieve membranes for efficient CO<sub>2</sub>/N<sub>2</sub> separation at ambient and subambient temperatures  
**Rachana Kumar**, Chen Zhang, Arun K. Itta and William J. Koros  
**J. Membr. Sci.**, 2019, 583, 9-15, doi.org/10.1016/j.memsci.2019.04.033 (IF 10.5)
  21. High performance carbon molecular sieve membranes resistance to aggressive feed stream contaminants.  
**Rachana Kumar** and William J. Koros  
**Ind. Eng. Chem. Res.**, 2019, 58, 6740–6746 (IF: 4.3)
  22. Carbon molecular sieve membranes for CO<sub>2</sub>/N<sub>2</sub> separations: Evaluating subambient temperature performance  
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**J. Membr. Sci.** 2019, 569, 1-6. (IF 10.5)
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**AIChE J.**, 2019, 65, e16611 doi.org/10.1002/aic.16611 (IF : 4.2)
  24. Highly productive carbon molecular sieve membranes for post- combustion CO<sub>2</sub> capture: Substrate resistance mitigation  
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  25. Synthesis and comparative charge transfer studies in porphyrin-fullerene dyads: Mode of attachment effect  
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  27. Synthesis and Charge Transport Properties of New Methanofullerenes  
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  29. Fullerene grafted graphene oxide with effective charge transfer interactions  
**Rachana Kumar\***, Saba Khan, Neha Gupta, SamyaNaqvi, Kumar Gaurav, Chhavi Sharma, Mahesh Kumar, Pramod Kumar, Suresh Chand  
**Carbon**, 2016, 107, 765-773; **Impact Factor : 11.3**
  30. Synthesis and ultrafast spectroscopic study of new [6,6] methanofullerenes.  
SamyaNaqvi, Neha Gupta, NeelamKumari, MukeshJewariya, Pramod Kumar, **Rachana Kumar\*** and Suresh Chand  
**RSC Adv.**, 2016, 6, 24889-244897; **Impact Factor :4.0**
  31. Bulk synthesis of highly conducting graphene oxide with long range ordering  
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**RSC Adv.**, 2015, 5, 35893-35898; **Impact Factor :4**
  32. A cost effective and eco-friendly one-pot process for PC61BM synthesis under aerobic conditions  
**Rachana Kumar\***, Samya Naqvi, Neha Gupta and Suresh Chand  
**RSC Adv.**, 2014, 4, 15675-15677; **Impact Factor :4**
  33. Stable graphite exfoliation by fullerenol intercalation via aqueous route  
**Rachana Kumar\***, Pramod Kumar, Samya Naqvi, Neha Gupta, Niharika Saxena, Jitendra Gaur, Jitendra K. Maurya and Suresh Chand  
**New J. Chem.**, 2014, 38, 4922-4930; **Impact Factor :3.9**
  34. Selenium-Containing  $\pi$ -Conjugated Polymers for Organic Solar Cells  
AsitPatra, **Rachana Kumar** and Suresh Chand  
**Israel J. Chem.**, 2014, 54, 621-641; **Impact Factor : 3.3**
  35. Magnetocaloric effect and refrigeration cooling power in amorphous Gd<sub>7</sub>Ru<sub>3</sub> alloys  
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**AIP Advances**, 2015, 5, 077125(1-8) (IF :1.5)
  36. Pressure dependent magnetic, AC susceptibility and electrical properties of Nd<sub>7</sub>Pd<sub>3</sub>  
Pramod Kumar, Puneet Jain and **Rachana Kumar**  
**RSC Advances**, 2015, 5, 58928-58935. **Impact Factor :4**
  37. Crystal structure and negative magnetization in Sm<sub>2</sub>Al and Sm<sub>1.988</sub>Gd<sub>0.012</sub>Al compounds  
A.K. Nigam Pramod Kumara, **Rachana Kumar**, S. Pandeya, K.G

- Physica B: Condensed Matter, 2014, 448, 6-8. Impact Factor : 2.4**
38. Carbon molecular sieve membrane performance tuning by dual temperature secondary oxygen doping (DTSOD)  
Rachana Singh, William J. Koros  
**Journal of Membrane Science, 2013, 427, 472-478. (IF 10.5)**
39. Electrochemical, Photophysical, and Magnetic Properties of Green Emitting Bis(2,5-Hexyloxy)-Phenylene-alt-Thiophene Fluorescent Conducting Oligomer Addended Fullerene-diol Dyad  
Rachana Singh, ThakohariGoswami  
**International Journal of Organic Chemistry, 2013, 3, 49-64.**
40. Photophysical and optical limiting properties of multifunctional hemi-ortho ester derivatives of fullerene: effects of TBAH doping, fullerene concentration and solvent polarity  
Rachana Singh, Thako Hari Goswami  
**Synthetic Metals 2011, 161(9-10), 670-679 (IF: 3.3)**
41. Understanding of thermo-gravimetric analysis to calculate number of addends in multifunctional hemi-ortho ester derivatives of fullerene  
Rachana Singh, ThakoHariGoswami  
**Thermochimica Acta 2011, 513(1-2), 60-67 (IF: 3.1)**
42. Effect of nature of addends and Ionic dopant on magnetic properties of multifunctional star-like hemi-ortho ester derivatives of fullerene  
Rachana Singh, Thako Hari Goswami  
**Synthetic Metals 2011, 161 (19-20), 2070-2077. (IF: 3.3)**
43. Recent development of fullerene research  
Rachana Singh, ThakoHariGoswami  
**Advances in Condensed Matter and Materials Research 2010, 7, 341-380.**
44. Acid Catalyzed 1, 2 Michael Addition Reaction: A Viable Synthetic Route in Designing Fullerene Core Starlike Macromolecule  
Rachana Singh, ThakoHariGoswami  
**J. Phys. Org. Chem. 2008, 21 (3), 225-236 (IF : 2.4)**
45. Synthesis And Evaluation of Thermal, Photophysical & Magnetic Properties of Novel Starlike Fullerene-Organosilane Macromolecules  
Rachana Singh, Thako Hari Goswami  
**J. Organomet. Chem. 2008, 693, 2021-2032. (IF: 2.3)**
46. Highly Luminescent Multifunctional Hemi-ortho Ester Derivatives of Fullerene  
Rachana Singh, ThakoHariGoswami  
**Synthetic Metals 2007, 157 (22-23), 951-955 (IF: 3.3)**
47. One Pot Synthesis of a Novel Water Soluble Fullerene Core Star-Like Macromolecule via Successive Michael and Nucleophilic Addition Reaction  
ThakoHariGoswami, Rachana Singh, SarfarazAlam, Gyanesh N. Mathur  
**Chemistry of Materials 2004, 16(12), 2442-2448 (IF: 10.5)**
48. Thermal Analysis: A Unique Method to Estimate the Number of Substituents in Fullerene Derivatives  
ThakoHariGoswami, Rachana Singh, SarfarazAlam, Gyanesh N. Mathur  
**ThermochimicaActa2004, 419, 97-104 (IF: 3.1)**

#### CONFERENCE PAPERS

1. "Michael Addition Reactions In Fullerene"  
Oral presentation in "National Seminar on Fullerene, Calixarine and Crown Ether" at Gujarat University during February 27-28, 2004  
ThakoHari Goswami\*, Rachana Singh, Sarfaraz Alam, G. N. Mathur
2. "FTNMR Study of Water Soluble Fullerene Derivatives" International Conference on "Magnetic Resonance in Biological Systems" (21st ICMRBS) January 16-21, 2005, Hyderabad.  
Rachana Singh, Sanjay Kanojia, Ajit Srivastava, T. H. Goswami, D. N. Tripathi
3. "Nonconventional Fullerene Core Starlike Dyad Materials"  
International Conference on "Nano-Materials for Electronics" Nov 27-29, 2006, C-MET, Pune.  
Rachana Singh, T. H. Goswami
4. "Iron Coated Fullerene Materials: Excellent Ferromagnetic Compound"  
National Conference on "Smart Materials & Recent Technologies" Feb 22-23, 2007, Tirupati.  
Rachana Singh, T. H. Goswami

5. Synthesis and Characterization of Fullerene Based Photovoltaic Materials  
**National Workshop on Nanomaterials and Nanotechnology**, March 24-25, 2007; Lucknow University, Lucknow.

**Rachana Singh**, T. H. Goswami, D. K. Setua, K. U. Bhasker Rao, R. S. Anand

**Awarded for Best Poster**

6. Novel Starlike Fullerene-Organosilane Dyad Macromolecules

**National Conference on the Emerging Trends in the Photovoltaic Energy Generation and Utilization**, 27-29 March, 2008

Indian Institute of Technology Kanpur

**Rachana Singh**, T. H. Goswami, D. K. Setua, K. U. Bhasker Rao, R. S. Anand

7. TAPSUN conference 2012 at NPL, New Delhi

8. Facile Synthesis of Graphene Oxide from Tattered Graphite for Device Applications

Samya Naqvi, Gaurav Kumar, Saba Khan, Neha Gupta, Niharika Saxena, Neeraj Chaudhari, Pramod Kumar, **Rachana Kumar\*** and Suresh Chand

**MACRO 2015**

**Awarded by ACS for Best Poster\***

9. Advanced Alternate HTL Materials for Organic Photovoltaics

**Invited Talk\*** at “First International Conference on Advanced Materials for Power Engineering” (ICAMPE-2015) 11-13 December 2015 at Mahatma Gandhi University, Kottayam, Kerala, India.

10. Synthesis and Electron Transport Studies of Perylenediimide based acceptors for Organic Photovoltaic Applications; IC3N-IIT

Samya Naqvi, Rachana Kumar and Suresh Chand

11. Charge Transport Studies of Perylenediimide based acceptors for Organic Photovoltaic Applications

Samya Naqvi, **Rachana Kumar** and Suresh Chand, ICTF-2017

12. Development of Fullerene based new Acceptor Materials Under Aerobic Conditions for Organic Photovoltaic Applications, IWPSD-Bangalore

Samya Naqvi, Neelam Kumari, **Rachana Kumar\***, G.D Sharma, RamilBharadwaj and Suresh Chand

13 Facile Synthesis of Graphene Oxide (*m*-GO) from Tattered Graphite for Device Applications

Samya Naqvi, Kumar Gaurav, Saba Khan, Neha Gupta, NiharikaSaxena, NeerajChaudhary, Pramod Kumar, **Rachana Kumar** and Suresh Chand, Macro-2015

14. Amine assisted methanofullerene synthesis, ICMTECH-2016

Samya Naqvi, Neha Gupta, **Rachana Kumar** and Suresh Chand

15. Stable Device Fabrication for Accurate measurement of Power Conversion Efficiency

Mehak Ahuja and **Rachana Kumar**

International conference on Advanced Materials and Nanotechnology at Jaypee Institute, Noida –, February 2020

16. E-Workshop on “Spectroscopic Techniques: Basics and applications” December 2020, CSIR, NPL.

17. Invited Lecture: “Advanced Materials and Instrumentation Based Engineering” (AMIBE April, 2021), IIT Allahabad.

18. Optimization of Parameters for Synthesis of Graphene Oxide with Long Range Order.

Komal Bhardwaj, Naveen Joy Kindo, **Rachana Kumar** at IIIT, Noida , AMN-2020

19. Invited lecture on "Basics and metrology of excitonic solar cells" NIT Uttarakhand, 2020.

20. Bulky end group appended Naphthalene diimide (NDI) derivatives: Influence on optical and transport properties. Oral presentation

Mehak Ahuja and Rachana Kumar

International Online Conference on Materials Science and Technology, ICMT, 2021, 12-14 November, 2021, Mahatma Gandhi University, Kottayam, Kerala, India

**Third prize for best presentation**

21. Naphthalenediimide derivative based paper strip chemical sensor for the visual detection of acids. Oral presentation

Mehak Ahuja and Rachana Kumar

Frontiers In Materials for Technological Applications, FIMTA, 2022, 3-5 August, 2022

CSIR-Institute of Minerals and Materials Technology (IMMT), Bhubaneswar

22. Synthesis and characterization of multichromophoric PDI-NDI molecule based electron transport material for organic solar cell. Oral presentation

Komal Bhardwaj and Rachana Kumar

International conference on Materials Science and Technology (ICMT-2021), 12-14 Nov, 2021

Mahatma Gandhi University, Kottayam, Kerala

23. Comparative study of aliphatic vs. aromatic substituted perylenediimide as electron transport layer material. Poster presentation

Komal Bhardwaj, Samya Naqvi, Rachana Kumar

National Science Day, 28<sup>th</sup> Feb 2022, Place: CSIR-NPL, New Delhi

**Third prize for best presentation**

24. Modulating the aggregation behaviour of perylenediimide derivative using different imide substituent for application in organic solar cell

Poster presentation

Komal Bhardwaj, Rachana Kumar

International conference on Frontiers In Materials for Technological Applications (FIMTA-2022), 3-5 Aug, 2022, CSIR-IMMT, Bhubaneswar