

Dr. Pravas Deria

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(a) Education and Professional Preparation

Calcutta University	Kolkata, India	Chemistry (Hons)	B.Sc.; 1999
Indian Institute of Tech.	Kanpur, India	Chemistry	M. Sc.; 2001
Univ. of Pennsylvania	Philadelphia, PA	Chemistry	Ph. D.; 2009
Duke University	Durham, NC	Materials Chemistry	Postdoc; 2010-2012
Northwestern University	Evanston, IL	Materials Chemistry	Postdoc; 2012-2015

(b) Appointments

Associate Professor, School of Chemical & Biomolecular Science, SIUC; 07/01/21 – Present
Assistant Professor, Department of Chemistry and Biochemistry, SIUC; 08/16/15 – 06/31/21
Postdoctoral Scholar, Department of Chemistry, Northwestern Univ., Mentor: Joseph T. Hupp; 08/12 – 07/15.
Postdoctoral Scholar, Department of Chemistry, Duke Univ., Mentor: Michael J. Therien; 02/10 – 07/12.
GRA, Department of Chemistry, Univ. of Pennsylvania, Mentor: Michael J. Therien; 08/02 – 12/09.
JRF-RA, Department of Chemistry, IIT- Kanpur India, Mentor: Vadapalli Chandrasekhar 08/01 – 05/02

(c) Honors and Awards

- *Energy Boost Seed Grant*, Advanced Coal and Research Center, SIU Carbondale, 2021-22
- *College-Level Scholar Excellence Award*, SIUC, 2020
- *University-Level Early Faculty Excellence Award*, SIUC, 2020
- *NSF CAREER Award*, 2020
- *Ralph E. Powe Junior Faculty Enhancement Award*- ORAU, 2016
- *Energy Boost Seed Grant*, Advanced Coal and Research Center, SIU Carbondale, 2016-17
- *Junior Research Fellowship*, Council for Scientific and Industrial Research India 2001-2002
- *Jawaharlal Nehru Center for Advanced Scientific Research*-Summer Res. Fellowship 2000, 2001
- *Rajiv Gandhi Science Talent Award*, Jawaharlal Nehru Center for Advanced UG Sci. Res., 2001
- *P. C. Rakshit Gold Medal*, Chemistry (Hons, BS) topper in R.K.M.R. College, Calcutta, India 2000.

(d) Independent Research Interest & Accomplishment

1. Efficient artificial light-harvesting antenna in porous molecular assemblies such as framework compositions for multi-electron activation of small molecules.
 - Mapping excitonic properties as a function of electronic symmetry of the linker and the framework
 - Established that the linker assembly in metal-organic frameworks (MOFs) entails correlated oscillators that display superradiance.
 - Defined the size of molecular excitons and correlated their anisotropic migration efficiency with framework topology (mathematical descriptor of structural arrangement).
 - Designed strategy for efficient anisotropic exciton migration in MOF (~90% singlet excitons can be moved ~500 Å) useful for photo and photoelectrocatalysis.
 - Designed strategies to split the harvested photons within MOF antennae into long-lived high-potential charges through excited-state complex formation in uniquely designed artificial 'reaction centers'.
 - Developed molecular photocatalytic assemblies for selective chemical transformations.
2. High-surface area, chemically and electrochemically accessible 3D porous compositions relevant for electro-/photoelectron-catalytic energy conversion.
 - Defined rules to modulate charge hopping process in metal-carboxylate derived MOFs

- Developed 3-dimensional porous semiconducting and conducting compositions.
 - Devised strategy to modulate metal-ligand electronic communication beyond the established metal-ligand connectivity.

(e) Teaching & Mentoring

- Designed and developed new Inorganic and Materials courses (survey and in-depth—in concordance with ACS expectations); integrated modern MOF research in the lab module of upper-level undergrad lab course.
- Taught *CHEM 210/210(H)* “Introduction to Chemical Principles/ Chemistry of Matter (Honors)/Lab” (Spring 2016; Summer 2017); *CHEM 411/410* “Intermediate Inorganic Chemistry/Lab”; *CHEM 519* “Advanced Topics in Inorganic Chemistry: Bioinspired Materials”; *CHEM 592* Intro to Research, *CHEM 595E/C* Advanced Seminar in Chemistry.
- Mentored 5 undergraduate students in research (3 females, 1 African American; two first-in-family degree earners) and published the results in peer-reviewed, high-impact journals. Served as Undergraduate Academic Advisor –advised over 25 undergraduates through the curricula towards their graduation.
- Designed and initiated RECM (research experience with chromophores and MOFs) program for regional High School students for exposure to research experience; mentored 3 students from Carbondale Community High School.
- *Advisor of graduate students*, Southern Illinois University, Fall 2015-present. Supervising 4.

(f) Publications (58 published; google scholar citation [5095](#); h index: 33)

Independent publications from SIUC:

1. Surendran Rajasree, S.; Yu, J.; Pratik, M. S.; Wang, R.; Kumbhar, A.; Cramer, C. **Deria, P.*** Superradiance and Directional Exciton Migration in Metal–Organic Frameworks. *J. Am. Chem. Soc.* **2022**, 144, 1396-1406.
2. Li, X.; Yu, J.; Lu, Z.; Duan, J.; Fry, H. C.; Gosztola, D. J.; Maindan, K.; Surendran Rajasree, S.; **Deria, P.*** Photo-Induced Charge Transfer with Small Driving Force Facilitated by Exciplex–like Complex Formation in Metal–Organic Frameworks. *J. Am. Chem. Soc.* **2021**, 143, 15286-15297.
3. Surendran Rajasree, S.; **Deria, P.*** Physical Properties of Porphyrin-based Crystalline Metal–Organic Frameworks. *Commun. Chem.* **2021**, 4, 47 (doi.org/10.1038/s42004-021-00484-4).
4. Li, Y.;[†] Surendran Rajasree, S.;[†] Lee, G. Y.; Yu, J.; Tang, J.-H.; Ni, R.; Li, X.; Li, G.; Houk, K. N.; **Deria, P.***; Stang, P. J.* Anthracene-Triphenylamine-Based Platinum(II) Metallacages as Synthetic Light-Harvesting Assembly. *J. Am. Chem. Soc.* **2021**, 143, 2908-2919.
5. Goswami, S.; Yu, J.; **Deria, P.***; Hupp, J. T.* Light Harvesting “Antenna” Behavior in NU-1000. *ACS Energy Lett.* **2021**, 6, 848-853.
6. Atilgan, A.; Cetin, M. M.; Yu, J.; Beldjoudi, Y.; Liu, J.; Stern, C. L.; Cetin, F. M.; Islamoglu, T.; Farha, O. K.; **Deria, P.***; Stoddart, J. F.; Hupp, J. T.* Post-Synthetically Elaborated BODIPY-based Porous Organic Polymers (POPs) for Photochemical Detoxification of a Sulfur Mustard Simulant. *J. Am. Chem. Soc.* **2020**, 142, 18554-18564.
7. Li, X.; Surendran Rajasree, S.; Yu, J.; **Deria, P.*** The Role of Photoinduced Charge Transfer for Photocatalysis, Photoelectrocatalysis and Luminescent Sensing in Metal-Organic Frameworks. *Dalton Trans.* **2020**, 49, 12892-12917.
8. Beldjoudi, Y.; Atilgan, A.; Weber, J. A. Roy, I.; Young, R. M.; Yu, J.; **Deria, P.**; Enciso, A. E.; Wasielewski, M. R.; Hupp, J. T.*; Stoddart, J. F.* Supramolecular Porous Organic Nanocomposites for Heterogeneous Photocatalysis of a Sulfur Mustard Simulant. *Adv. Mater.* **2020**, 32, 2001592.
9. Yu, J.; Anderson, R.; Li, X.; Xu, W.; Goswami, S.; Surendran Rajasree, S.; Maindan, K.; Gómez-Gualdrón, D. A.; **Deria, P.*** Improving Energy Transfer within Metal-Organic Frameworks by Aligning Linker Transition Dipole along Framework Axis. *J. Am. Chem. Soc.* **2020**, 142, 11192-11202.
10. Li, X.; Yu, J.; Gosztola, D. J.; Fry, H. C.; **Deria, P.*** Wavelength-Dependent Energy and Charge Transfer in MOF: A Step towards Artificial Porous Light-Harvesting System. *J. Am. Chem. Soc.* **2019**, 141, 16849-16857.
11. Maindan, K.; Li, X.; Yu, J.; **Deria, P.*** Controlling Charge-Transport in Metal-Organic Frameworks: Contribution of Topological and Spin-State Variation on the Fe-Porphyrin Centered Redox Hopping Rate. *J. Phys. Chem. B* **2019**, 123, 8814-8822.

12. Yu, J.; Li, X.; **Deria, P.*** Light-Harvesting in Porous Crystalline Compositions: Where We Stand towards Robust Metal-Organic Frameworks. *ACS Sustainable Chem. Eng.* **2019**, *7*, 1841-1854.
13. Li, X.; Maindan, K.; **Deria, P.*** Metal-Organic Frameworks -Based Electrocatalysis: Insight and Future Perspectives. *Comments Inorg. Chem.* **2018**, *38*, 166-209.
14. Yu, J.; Park, J.; **Van Wyk, A.**;[§] Rumbles, G.; **Deria, P.*** Excited State Electronic Properties in Zr-based MOFs as a Function of Topological Network. *J. Am. Chem. Soc.* **2018**, *140*, 10488-10496.
15. Yu, J.; **Van Wyk, A.**;[§] **Tanner, S.**; **Deria, P.*** Charge Transfer within Metal-Organic Frameworks: The Role of Polar Node in the Electrocatalysis and Charge Storage. *ECS Trans.* **2018**, *85*, 559-564.
16. **Van Wyk, A.**;[§] **Tanner, S.**;[‡] Park, J.; **Deria, P.*** Charge Transfer within Zr-based Metal-Organic Framework: The Role of Polar Node. *J. Am. Chem. Soc.* **2018**, *140*, 2756-2760.
17. **Deria, P.**;^{*} Yu, J.; **Smith, T.**;[‡] Balaraman, R. P. Ground-State versus Excited-State Interchromophoric Interaction: Topology Dependent Excimer Contribution in Metal-Organic Framework Photophysics. *J. Am. Chem. Soc.* **2017**, *139*, 5973-5983.
18. **Deria, P.**;^{*} Yu, J.; Balaraman, R. P.; Mashni, J.; **White, S. N.**;[§] Topology-Dependent Emissive Properties of Zirconium-Based Porphyrin MOFs. *Chem. Commun.* **2016**, *52*, 13031-13034.
19. **Deria, P.**;^{*} Gómez-Gualdrón, D. A.; Hod, I.; Snurr, R. Q.;^{*} Hupp, J. T.;^{*} Farha, O. K.* Framework-Topology-Dependent Catalytic Activity of Zirconium-Based (Porphinato)zinc(II) MOFs. *J. Am. Chem. Soc.* **2016**, *138*, 14449-14457.

[‡] *SIU-Undergraduate*, [§] *NSF-REU student*, [†] equal contribution, grad students in collaborative works.

Selective other publications after joining SIUC.

20. **Deria, P.**;[†] Gómez-Gualdrón,[†] D. A.; Bury, W.; Schaef, H. T.; Wang, T. C.; Thallapally, P. K.; Sarjeant, A. A.; Snurr R. Q.; Hupp, J. T.; Farha, O. K. Ultraporous, Water Stable, and Breathing Zirconium-Based Metal-Organic Frameworks with *ftw* Topology. *J. Am. Chem. Soc.* **2015**, *137*, 13183-13190.
21. Hod, I.; Sampson, M. D.; **Deria, P.**; Kubiak, C. P.; Farha, O. K.; Hupp, J. T. Fe-Porphyrin Based Metal-Organic Framework Films as High-Surface Concentration, Heterogeneous Catalysts for Electrochemical Reduction of CO₂. *ACS Catalysis.* **2015**, *5*, 6302-6309.
22. Hod, I.; **Deria, P.**; Bury, W.; Mondloch, J. E.; Kung, C.-W.; So, M.; Farha, O. K.;^{*} Hupp, J. T.* A Porous, Proton Relaying, Metal-Organic Framework Material that Accelerates Electrochemical Hydrogen Evolution. *Nat. Commun.* **2015**, *6*, 8304 (DOI: 10.1038/ncomms9304).
23. McGonigal, P. R.; **Deria, P.**; Hod, I.; Moghadam, P.; Avestro, A.-J.; Horwitz, N. E.; Gibbs-Hall, I. C.; Blackburn, A. K.; Chen, D.; Botros, Y. Y.; Wasielewski, M. R.; Snurr, R. Q.; Hupp, J. T.; Farha, O. K.; Stoddart, J. F. Electrochemically Addressable Trisradical Rotaxanes Organized within a Metal-Organic Framework. *Proc. Natl. Acad. Sci. USA*, **2015**, *112*, 11161-11168.

Selective publications before joining SIUC (August 2015)

24. **Deria, P.**; Gregory, Y.; Snurr, R. Q.; Farha, O. K.; Hupp, J. T. Water Stabilization of Zr₆-Based MOFs via Solvent-Assisted Ligand Incorporation. *Chem. Sci.* **2015**, *6*, 5172-5176.
25. **Deria, P.**;[†] Li, S.;[†] Snurr, R. Q.; Farha, O. K.; Hupp, J. T. A MOF Platform for Incorporation of Complementary Organic Motifs for CO₂ Binding. *Chem. Commun.* **2015**, *51*, 12478-12481.
26. **Deria, P.**; Bury, W.; Hod, I.; Kung, C.-W.; Karagiari, O.; Hupp, J. T.; Farha, O. K. MOF Functionalization via Solvent-Assisted Ligand Incorporation: Phosphonates vs. Carboxylates. *Inorg. Chem.* **2015**, *54*, 2185-92.
27. **Deria, P.**; Olivier, J.-H.; Park, J.; Therien, M. J. Potentiometric, Electronic, and Transient Absorptive Spectroscopic Properties of Oxidized Single-Walled Carbon Nanotubes Helically Wrapped by Ionic, Semiconducting Polymers in Aqueous and Organic Media. *J. Am. Chem. Soc.* **2014**, *136*, 14193-14199.
28. **Deria, P.**; Mondloch, J. E.; Karagiari, O.; Bury, W.; Hupp, J. T.; Farha, O. K. Beyond Post-Synthesis Modification: Evolution of Metal-Organic Frameworks via Building Block Replacement. *Chem. Soc. Rev.* **2014**, *43*, 5896-5912.
29. **Deria, P.**;[†] Bury, W.;[†] Hupp, J. T.; Farha, O. K. Diverse Functionalization of NU-1000 Platform by Solvent-Assisted Ligand Incorporation. *Chem. Commun.* **2014**, *50*, 1965-1968.

30. **Deria, P.**; Mondloch, J. E.; Tylianakis, E.; Ghosh, P.; Bury, W.; Snurr, R. Q.; Hupp, J. T.; Farha, O. K. Perfluoroalkane Functionalization of NU-1000 via Solvent-Assisted Ligand Incorporation: Synthesis and CO₂ Adsorption Studies. *J. Am. Chem. Soc.* **2013**, *135*, 16801-16804.
31. **Deria, P.**; Von Bargen, C. D.; Olivier, J.-H.; Kumbhar, A. S.; Saven, J. G.; Therien, M. J. Single-Handed Helical Wrapping of Single-Walled Carbon Nanotubes by Chiral, Ionic, Semiconducting Polymers. *J. Am. Chem. Soc.* **2013**, *135*, 16220-16234.
32. Park, J.; **Deria, P.**; Therien, M. J. Dynamics and Transient Absorption Spectral Signatures of the Single-Walled Carbon Nanotube Electronically Excited Triplet State. *J. Am. Chem. Soc.* **2011**, *133*, 17156-17159.
33. **Deria, P.**; Sinks, L. E.; Park, T.-H.; Tomezsko, D.; Burkman, M. J.; Bonnel, D. A.; Therien, M. J. Phase Transfer Catalysts Drive Diverse Organic Solvent Solubility of Single-Walled Carbon Nanotubes Helically Wrapped by Ionic, Semiconducting Polymer. *Nano Lett.* **2010**, *10*, 4192-4199.

(g) Synergistic Activities

- *Undergraduate and Graduate Educations Committee:*
 - Inorganic Chemistry Team (developing and improving of Inorganic Chemistry courses)
 - Idea Committee (improvement of graduate recruitment & curricula)
 - Undergraduate Advisor (guiding students with the course towards their future track)
 - Graduate Advisement Committee (guiding new grad students until they join their respective labs).
- *University-level Committee:*
 - University-Level Early Career Faculty Excellence Award Committee, 2021
 - College of Agricultural, Life and Physical Sciences (CALPS) Dean Search Committee, 2021
- *Conference Chair/Co-chair:*
Served as Co-Chair at the 256th and 253rd ACS National Meeting
- *Peer-reviewed for journal:* J. Am. Chem. Soc.; Nature Commun.; ACS App. Mater. & Interface; Adv. Mater.; Chem. Euro J.; Chem. Commun.; CrystEngComm; Inorg. Chem.; J. Mater. Chem. A/C.
- *Proposal review:* ACS-PRF, Ralph E. Powe, NSF
- *Society Membership Activities:* ACS, ECS, I-APS, and Society of Porphyrins and Phthalocyanines.

(h) Selective invited lectures:

- **Deria, P.** “*Tuning Redox Hopping Charge-Transport in Metal–Organic Frameworks*” 239th Electrochemical Society, Webinar, May-June, **2021**.
- **Deria, P.** “*Understanding Exciton Migration in Crystalline Porous Molecular Assembly*” 11th ICPP, SPP, Webinar, June, **2021**.
- **Deria P.** “*Understanding Excited State Processes and Dynamics in Metal-Organic Frameworks*” NJIT, March 2021.
- **Deria P.** “*Limitation in Linker Design for Efficient Energy Transfer within Crystalline MOFs*” in *Photochemistry Spotlight: Shining Light on the Big Questions in Photochemistry*, June **2020**, Webinar.
- **Deria P.** “*Excited-State Properties and Energy Transduction in Metal–Organic Frameworks towards Low-Density Molecular Light-Harvesting Assemblies*” I-APS, Sarasota, January **2020**.
- **Deria, P.** “*Towards Porous Light-Harvesting Frameworks: How Topology Controls the Critical Properties*” Department of Chemistry, Bowling Green State University, September **2019**.
- **Deria, P.** “*Uncovering Modular Optoelectronic Properties within Crystalline Frameworks for Light Harvesting & Energy Conversion*” Department of Chemistry, St. Louis University, September **2019**.
- **Deria, P.** “*Topologically Controlled Optoelectronic Properties in Metal-Organic Frameworks*”, Center for Nanoscale Materials, Argonne National Laboratories, December **2018**.
- **Deria, P.** “*Framework-Topology Dependent Optoelectronic Properties of Zr-based Metal-Organic Frameworks. Department of Chemistry*” Tulane University, October, **2018**.
- **Deria, P.**; Yu, J.; Van Wyk A.; Smith, T. “*Excited-State Properties of Crystalline Porous Molecular Assembly*” The 10th ICPP, SPP, Munich, Germany, July, **2018**.
- **Deria, P.**; Van Wyk A.; Smith, T. “*Charge Transfer within Metal-Organic Frameworks: The Role of Polar Node in the Electrocatalysis and Charge Storage*” 233rd Electrochemical Society, Seattle, April, **2018**.

- **Deria, P.** “*Photophysical properties of crystalline self-assembled porous materials: Contribution of interchromophoric interactions and environment*” 254th ACS; Washington DC, August, **2017**.
- **Deria, P.;** Jamil, M.; Yu, J. “*Porphyrin-based Metal-Organic Frameworks: New Materials for Electro-optics and Energy Conversion*” The 9th ICPP, SPP, Jiangsu, China, **2016**.

(i) Representative Student’s Oral Contribution:

- **Maindan, K.;** Li, X.; Yu, J.; Deria, P. “*Improving charge transport in metal-organic frameworks: Alteration of iron-porphyrin centered redox hopping rate.*” 262nd ACS; Atlanta GA, August **2021**.
- **Li, X.;** Deria, P. “*Energy and charge transfer dynamics in porphyrin: MOF composite.*” 258th ACS; San Diego CA, August **2019**.
- **Yu, J.;** Deria, P. “*What Should Be Considered to Control the Electronic Structure of Excited States: Impact of Topological Arrangement.*” 258th ACS, San Diego CA, August **2019**.
- **Yu, J.;** Deria, P. “*Extended singlet excited state lifetime via excimer formation as a function of MOF topology.*” 254th ACS; Washington DC, August **2017**.