

## Dr. Gautam's Collaborators Receive Worldwide Attention for "Transparent Solar Panels for Power Generating Windows" Research



Dr. Bhoj Gautam's research group in the Department of Chemistry, Physics and Materials Science is working on organic solar cells. He has collaborated with many researchers within the U.S. and internationally, and has published more than 40 papers on organic electronics. His collaborator, Dr. Harald Ade, North Carolina State University, and Dr. Yongxi Li, University of Michigan, have recently published a paper in the *Proceedings of the National Academy of Sciences* where they reported a new record of transparent solar cell efficiency. With this invention, skyscrapers could be turned into solar energy collectors. This work was highlighted by several media outlets worldwide.

<https://scitechdaily.com/transparent-solar-panels-for-windows-hit-new-efficiency-record-could-help-enable-skyscrapers-to-serve-as-power-sources/amp/>

<https://www.azom.com/news.aspx?newsID=54441>

<https://insights.globalspec.com/article/14797/power-generating-windows-appear-closer-with-efficient-semi-transparent-solar-cells>

[https://www.courthousenews.com/transparent-solar-panels-could-turn-skyscrapers-into-energy-collectors/?utm\\_source=rss&utm\\_medium=rss&utm\\_campaign=transparent-solar-panels-could-turn-skyscrapers-into-energy-collectors](https://www.courthousenews.com/transparent-solar-panels-could-turn-skyscrapers-into-energy-collectors/?utm_source=rss&utm_medium=rss&utm_campaign=transparent-solar-panels-could-turn-skyscrapers-into-energy-collectors)

Dr. Gautam, Dr. Daryush Ila, Associate Vice Chancellor for Research and Technology Transfer and Dr. Assad Tavakoli, Broadwell College of Business and Economics are also working on "Conformal Solar Windows" using organic solar cells. The following are papers published by Dr. Gautam in collaboration with Dr. Ade and Dr. Li.

1. The role of FRET in non-fullerene organic solar cells: Implications for molecular design, B. R. Gautam, R. Younts, J. Carpenter, H. Ade, and K. Gundogdu, *J. Phys. Chem. A*, 15, 3764-3771 (2018).
2. Polymer non-fullerene solar cells of vastly different efficiencies for minor side-chain modification: Impact of charge transfer, carrier lifetime, morphology and mobility, O. M. Awartani, B. Gautam, W. Zhao, R. Younts, J. Hou, K. Gundogdu, and H. Ade, *J. Mater. Chem. A*, 2018, DOI: 10.1039/C7TA01746D.

3. Strong variation of molecular weight–dependent interaction parameter: impact on morphology formation and performance in DPP3T:fullerene bulk heterojunction solar cells, J.-H. Kim, A. Gadisa, C. Schaefer, H. Yao, B. R. Gautam, N. Balar, M. Ghasemi, B. T. O’Connor, K. Gundogdu, J. Hou, and H. Ade, *J. Mater. Chem. A*, 5, 13176-13188 (2017).
4. Near-infrared non-fullerene organic solar cells with high efficient charge separation at a small driving force, Y. Li\*, L. Zhong\*, B. Gautam\*, J.-D Lin, F.-P. Wu, Z.-Q. Jiang, Z.- G. Zhang, Z. Zhang, K. Gundogdu, Y. Li, and L.-S. Liao, *Energy Environ. Sci.*, 10, 1610- 1620 (2017).
5. Efficient charge transfer and fine-tuned energy level alignment in a THF-processed fullerene-free organic solar cell that yields 11.3% efficiency, Z. Zheng\*, O. M. Awartani\*, B. Gautam\*, D. Liu, Y. Qin, W. Li, A. Bataller, K. Gundogdu, H. Ade, and J. Hou, *Adv. Mater.* (2016). DOI: 10.1002/adma.201604241.
6. Fast charge separation in a non-fullerene organic solar cell with a small driving force, J. Liu, S. Chen, D. Qian, B. Gautam, G. Yang, J. Zhao, J. Bergqvist, F. Zhang, W. Ma, H. Ade, O. Inganäs, K. Gundogdu, F. Gao and H. Yan, *Nature Energy* 1, 16089 (2016).
7. Charge photogeneration in organic photovoltaics: Role of hot versus cold charge transfer excitons, B. R. Gautam, R. Younts, W. Li, L. Yan, E. Danilov, E. Klump, I. Constantinou, F. So, W. You, H. Ade, and K Gundogdu, *Adv. Energy Mater.* 1501032 (2015). Front cover of Journal.
8. Direct optical observation of stimulated emission from hot charge transfer excitons in bulk heterojunction polymer solar cells, B. R. Gautam, A. Barrette, C. Mai, L. Yan, Q. Zhang, E. Danilov, W. You, H. Ade, and Kenan Gundogdu, *J. Phys. Chem. C*, 119, 19697–19702 (2015).
9. A PCBM electron transport layer containing small amounts of dual polymer additives that enables enhanced perovskite solar cell performance, Z. Zhu, Q. Xue, H. He, K. Jiang, Z. Hu, Y. Bai, T. Zhang, S. Xiao, K. Gundogdu, B. R. Gautam, H. Ade, F. Huang, K. S. Wong, H. Yip, S. Yang, and H. Yan, *Adv. Sci.*, 1500353 (2015).

**Research Group Website:** <https://fsusites.uncfsu.edu/bgautam/>

**Faculty Department Website:** <https://www.uncfsu.edu/academics/colleges-schools-and-departments/college-of-health-science-and-technology/department-of-chemistry-physics-and-materials-science/faculty-and-staff/gautam>