

Lighting the Way: Photocatalysis for a Sustainable Chemical Future

Prof. Shoubhik Das

¹University of Bayreuth, Bayreuth, Germany.

Our modern world depends heavily on chemistry, from the fuels that power our cars to the plastics in our homes. But many of these processes rely on fossil resources, generate waste, and consume large amounts of energy. To build a more sustainable future, we need new ways of making the materials and fuels we use every day. Photocatalysis offers one such pathway. By using light, especially sunlight, as the driving force, photocatalysis allows us to perform chemical reactions in cleaner, safer, and more energy-efficient ways. Just as plants use photosynthesis to turn sunlight into food, scientists are now developing materials that can use light to turn waste into valuable products, split water into clean fuels, or capture and reuse carbon dioxide.

In this lecture, I will introduce the exciting field of photocatalysis and explain how it is helping us reimagine the foundations of chemistry. We will explore how new light-responsive materials are designed, how they can help recycle plastics or create renewable fuels, and why they are central to achieving a circular economy. Along the way, I will share examples of recent breakthroughs and discuss the challenges that remain before these technologies become part of our daily lives. By “lighting the way,” photocatalysis shows us how the simple power of light can be transformed into a key tool for sustainability, opening new possibilities for chemistry that is both innovative and kinder to our planet.

References:

- [1] Y. Qin, R. Cauwenbergh, S. Pradhan, R. Maiti, R.; P. Frank, S. Das. *Nature Commun.* **14**, 7604 (2023).
- [2] Y. Qin, T. Zhang, V. Ching, S. Raman, S. Das. *Chem* **8**, 2472 (2022).
- [3] T. Zhang, J. Rabeah, S. Das. *Nature Commun.* **15**, 5208 (2024).
- [4] T. Zhang, J. Vanderghinste, A. Guidetti, S. Van Doorslaer, S. Das. *Angew. Chem. Int. Ed.* **61**, e202212083 (2024).
- [5] R. Maiti, J. Chakraborty, P. Voort, S. Das. *Angew. Chem. Int. Ed.* DOI: 10.1002/anie.202415624 (2024).
- [6] A. Gopakumar, P. Ren, J. Chen, B. Rodrigues, V. Ching, A. Jaworski, S. Doorslayer, A. Rokicinsa, P. Kustrowski, G. Barcaro, S. Monti, A. Slabon, S. Das. *J. Am. Chem. Soc.* **144**, 2603 (2022).
- [7] P. Ren, G. Barcaro, S. Monti, X. Li, J. Rabeah, P. Kustrowski, J. Silvestre, S. Bals, S. Das. *J. Am. Chem. Soc.* **145**, 16584 (2023).
- [8] P. K. Sahoo, R. Maiti, P. Ren, G. Barcaro, S. Monti, X. Li, J. Rabeah, P. Kustrowski, J. Silvestre, S. Das. *J. Am. Chem. Soc.* **147**, 11829, (2025).

CONTACT/PRESENTING AUTHOR

*S. Das; Shoubhik.das@uni-bayreuth.de

Biography

Prof. Shoubhik Das

University of Bayreuth, Bayreuth, Germany.

Phone No.: +49-92155-2680

E-mail: Shoubhik.das@uni-bayreuth.de



Research Career

- Aug, 2023 - Chair professor (W3)**
Department of Chemistry, University of Bayreuth, Germany.
- Nov, 2019 - Assistant professor (Tenure track)**
July, 2023
Department of Chemistry, University of Antwerp, Belgium.
- Aug, 2015 - Independent research group leader (Liebig Fellow)**
Oct, 2019
Institut für Organische und Biomolekulare Chemie
Georg-August-Universität Göttingen, Germany.
- Jan, 2013 - Scientist with Prof. Dr. Paul J. Dyson**
July, 2015
École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland.
- Jan, 2012 - Post-doctoral research with Prof. Dr. Matthew J. Gaunt**
Dec, 2012
University of Cambridge, Cambridge, UK.
- 9th Jan, 2012 Ph.D. degree** obtained in the thesis entitled “*Novel catalytic methods for hydrosilylation of carboxylic acid derivatives and related reactions*”.
- Nov, 2008 - Ph.D. with Prof. Dr. Matthias Beller**
Dec, 2011
Leibniz Institut für Katalyse e. V.
Rostock, Germany.
- Nov, 2006 - Research chemist at GlaxoSmithKline**
Oct, 2008
Early-stage drug discovery, Stevenage, UK.
- July, 2006 - Research Chemist at Ranbaxy Pharmaceuticals**
Oct, 2006
Chemical Research Department, India.
- June, 2004 - Master of Science (Chemistry)**
May, 2006
IIT Kharagpur, Kharagpur, India.

Research Interest

As a PI, I have always intended to keep a balance between fundamental and applied research, with an emphasis in **homogeneous, heterogeneous catalysis and green chemistry**. In future, I would like to develop novel heterogeneous photo/electrocatalysts for the utilisation of small molecules such as CH₄, CO₂, O₂, N₂O in organic synthesis as well as for the synthesis of fuel-related molecules.

Awards and Recognitions

- 2022 Advisory board member of ‘Tetrahedron Green Chem’
2022 Editorial board member of ‘Industrial Chemistry and Materials’

2022	Editorial board member of 'Green Synthesis and Catalysis'
2021	FWO Odysseus award (1 M Euro)
2021	Collen Francqui lecturer award
2020	Finalist for the European Young Chemist Award (independent research)
2020	EuChemS young investigator, representative of Belgium
2020	JSP fellowship from the Swiss Chemical society
2019	'Your JOC' Talent award
2018	Extension of Liebig Fellowship
2015	Liebig Fellowship from Fond der Chemischen Industrie
2014	Selected as a finalist for the European Young Chemist Award
2012	Cambridge post-doctoral fellowship
2012	Leibniz post-doctoral fellowship
2010	Selected as one of the most talented young chemists (EuChemS, 2010)
2008	Annex fellowship from Leibniz Society
2008	Scientist, Indian Space Research Organisation (declined)
2006	UK-India Educational Research Initiative (UKERI) fellowship
2005	MCM scholarship, IIT Kharagpur, India

Publications in Journals & Patents

Since 2008, I have authored >90 articles that have been cited a total of >7800 times (h-index = 53, reference from google scholar). Additionally, my m-index (H-index/ time spent since arrival of first article) is 3.1 which clearly indicates the strong impact of my research at my young academic age. Among these articles, I have published 60 as a corresponding author. More than 50% of my contributions have been published in the most prestigious journals in chemistry (3x *Chem. Soc. Rev.*, 2x *Adv. Mater.*, 2x *Chem*, 2x *Nat. Commun.*; 2x *Nat. Protocol*; 13x *Angew. Chem. Int. Ed.*; 9x *J. Am. Chem. Soc.*; 1x *ACS Central Science*; 1x *Adv. Science*; 8x *ACS Catal.*, 7x *Green Chem.*; 3x *Chem. Sci.*).

I have filed two European patents:

1. Novel photocatalysts for the generation of H₂O₂: **EP21175266.2**
2. An integrated strategy for the valorization of plastics into aromatics: **EP21209912.1**

Details of projects handled

Since 2015, I have collected around 10.0 ME funding and I have received funding from these organizations: Liebig Funding, China Scholarship Council funding, DAAD funding, Nagelschneider funding, FWO funding, DFG funding, FWO Odysseus grant, FWO, DAAD, IOF in UAntwerp, Novo-Nordisc Foundation, DOCPRO in UAntwerp.