

FROM THE MARYLAND SECTION OF THE AMERICAN CHEMICAL SOCIETY
IRA REMSEN MEMORIAL LECTURE

Monday November 17, 2025

Johns Hopkins University, Remsen 101, 6:30 PM
Receptions to precede and follow in Remsen 140**Professor Bettina V. Lotsch**Nanochemistry Department, Max Planck Institute for Solid State
Chemistry, Germany*“Optoelectronics meets Optoinics: Energy Conversion and
Light Storage in Carbon Nitrides and Beyond”*

Harnessing and storing intermittent renewable energy sources such as wind and solar power is essential for building a sustainable energy future. Meeting this challenge requires innovative materials and device concepts that can bridge the gap between energy capture and storage. Inspired by the light and dark reactions of natural photosynthesis, we have recently discovered a new class of “light-storing” materials capable of absorbing, converting, and storing solar energy through ion-mediated trapping of photoinduced charge carriers. In this talk, I will introduce the emerging field of optoinics¹ and explore its implications for the design of new materials that integrate optoelectronic and ionic functionality – including 2D carbon nitrides, transition metal oxides, and covalent organic frameworks.²⁻⁴ I will highlight how coupling of light harvesting with energy storage opens pathways to novel energy utilization concepts such as “dark photocatalysis”, photomemristive sensors, direct solar batteries, and light-driven microswimmers with photocapacitive behavior—representing a new generation of self-powered, autonomous systems.⁵⁻⁷

[1] A. Gouder, B.V. Lotsch, *Solid State Ionics* 431, 117018 (2025)

[2] F. Podjaski, B.V. Lotsch, *Adv. Energy Mater* 11, 202003049 (2021)

[3] Y. Wang, Y.-T. Chan, T. Oshima, V. Duppel, S. Bette, K. Küster, A. Gouder, C. Scheurer, B.V. Lotsch, *J. Am. Chem. Soc.* 146, 25467-25476 (2024)

[4] B.B. Rath, L. Fuchs, F. Stemmler, A. Rodríguez-Camargo, Y. Wang, M. Dorfner, J. Olbrich, J. van Slageren, F. Ortman, B.V. Lotsch, *J. Am. Chem. Soc.* 147, 18492–18503 (2025)

[5] A. Gouder, A. Jimenez-Solano, N.M. Vargas-Barbosa, F. Podjaski, B.V. Lotsch, *Mater. Horiz.* 9, 1866–1877 (2022)

[6] A. Gouder, F. Podjaski, A. Jiménez-Solano, J. Kröger, Y. Wang, B.V. Lotsch, *Energy Environ. Sci.* 16, 1520–1530 (2023)

[7] V. Sridhar, F. Podjaski, Y. Alapan, J. Kröger, L. Grunenberg, V. Kishore, B.V. Lotsch, M. Sitti, *Sci. Rob.* 7, eabm1421 (2022)