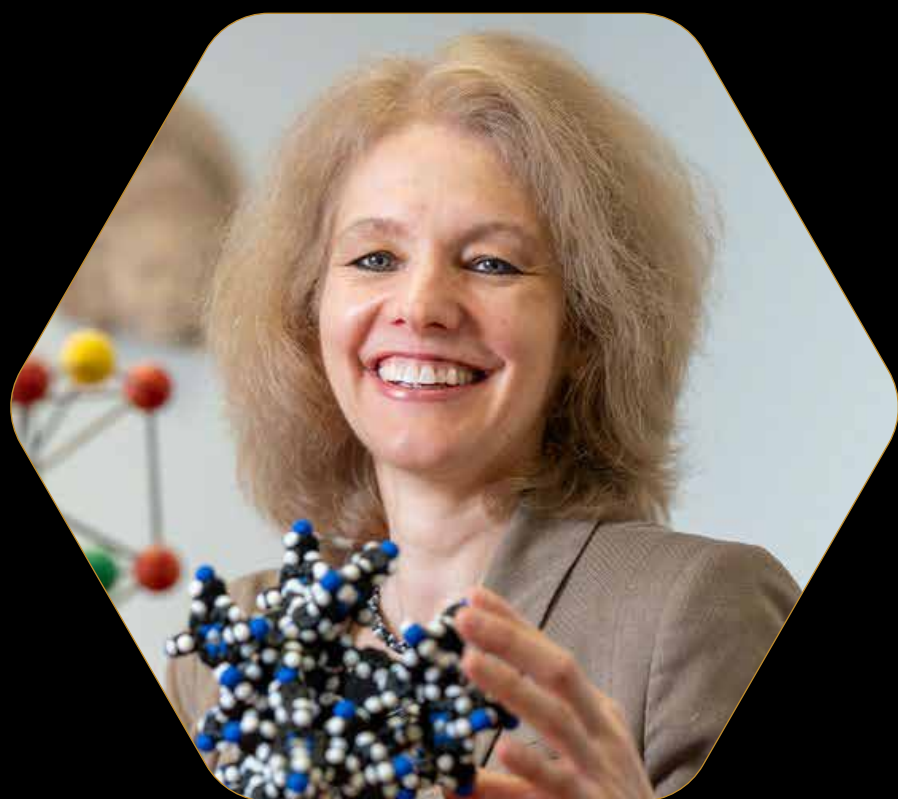




Prof. Bettina Lotsch Nanochemistry Department, Max Planck Institute for Solid State Chemistry, Stuttgart, Germany



October 30th



11:30 h



Assembly Hall

Abstract

Optoelectronics Meets Ionics: From Photo-Intercalation to Solar Batteries

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The transition towards a sustainable energy landscape depends critically on our ability to capture and store energy from intermittent renewable sources, particularly sunlight and wind. Achieving this goal calls for new materials and integrated device architectures that directly couple energy conversion with storage. Taking inspiration natural photosynthesis, we have recently identified a new class of light-storing materials in which solar energy is captured and retained through ion-mediated stabilization of photogenerated charge carriers. In my talk I will reflect on the emerging field of optoionics and explore its potential for the design of “optoionic” materials that integrate optoelectronic and ionic processes, exemplified by light storing 2D oxides, carbon nitrides and other molecular frameworks, including metal-organic frameworks (MOFs) and covalent organic frameworks (COFs). The coupling of solar energy conversion with electrochemical energy storage opens innovative pathways for next-generation energy systems, including “dark photocatalysis”, photomemristive sensors, direct solar batteries, and light-driven microswimmers with photocapacitive behavior. These concepts represent a new paradigm in self-powered, autonomous devices, where energy conversion, storage, and actuation are unified in a single material platform.

Bettina V. Lotsch — Short Biography

Prof. Dr. Bettina V. Lotsch is Director of the Department of Nanochemistry at the Max Planck Institute for Solid State Research in Stuttgart, Germany, a position she has held since 2017. She is also an Honorary Professor at Ludwig Maximilian University of Munich, an Adjunct Professor at the University of Stuttgart, and Co-founder and Co-Director of the SolBat Center since 2024.

Her research focuses on the development of advanced materials for sustainable energy technologies and future information systems, with particular emphasis on molecular and porous materials, including metal-organic frameworks (MOFs), covalent organic frameworks (COFs), carbon nitrides, and two-dimensional materials.

Her pioneering work has contributed to the development of materials that combine solar energy conversion and storage, as well as to the emerging field of optoionics, which integrates optical and ionic processes for applications in energy conversion, sensing, data storage, and neuromorphic computing.

In 2026, she was elected a member of the German National Academy of Sciences Leopoldina in recognition of her outstanding scientific contributions.