Azobenzenes: The Drosophila of Photoswitches – From Molecular Probes to Energy Solutions

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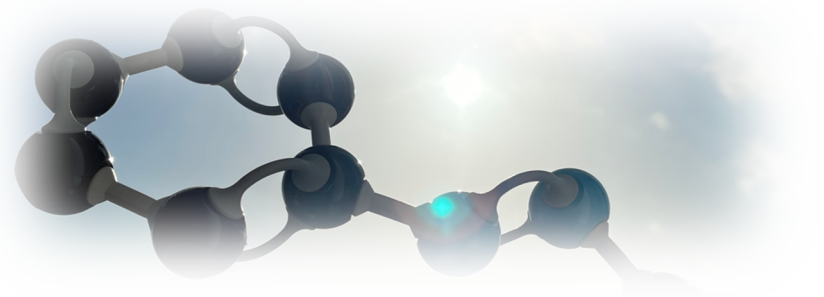
Photoswitches exhibit the distinctive ability to undergo structural changes upon irradiation, often accompanied by alterations in properties or functions. Azobenzenes, in particular, have emerged as one of the most extensively studied and utilized photoswitches due to their substantial geometric changes, high stability, fatigue resistance, and facile synthesis and derivatization. Their application potential spans medicinal, biological, and materials science domains. Our research has employed azobenzenes as molecular tools to investigate fundamental interactions at the molecular level, serving as 'molecular wind-up meters' to provide insights into energy storage mechanisms.[1] These basic insights are instrumental in designing functional azobenzenes for practical applications, such as energy storage. We will discuss the utilization of azobenzenes in molecular solar thermal storage (MOST) systems, where light energy is absorbed and stored in a metastable state, and subsequently released as heat upon an external trigger.[2] Furthermore, we have explored the potential of azobenzenes as redox-active materials for battery applications.[3] Through appropriate substitution of the core structure, azobenzenes can function as both anolytes and catholytes, positioning them as promising candidates for symmetric redox flow batteries. This presentation will elaborate on the underlying concepts and showcase our most recent experimental results.



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