



N-HETEROPOLYZYKLEN ALS
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UNIVERSITÄT
HEIDELBERG
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SEIT 1386

**“ENERGY OF CHEMICAL BONDS AS A DRIVING FORCE FOR ORGANIC
REACTIONS: MOLECULAR SPRINGS, STEREOELECTRONIC
FRUSTRATION, AND ELECTRON UPCONVERSION”**

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12. Oktober 2023, 13.15 Uhr, INF 252, Kleiner Hörsaal

Molecules store energy and, as bonds are formed and broken, every chemical process can either store or release energy. This talk will discuss practical ways for incorporating this common knowledge into reaction design and in searching for new physical phenomena.

After outlining the interplay of kinetics with thermodynamics and the special role of weak bonds in catalysis, I will introduce familiar textbook functionalities that accumulate more energy than an excited state, and show how one can make formation of any reactive intermediate thermodynamically feasible.

I will show that the key to controlling the flow of energy in chemical reactions is in using unique stereoelectronic features of each functionality and in coupling unfavorable and favorable elementary steps in a chain of chemical transformations.

In the final part, I will introduce the phenomenon of electron upconversion, a counterintuitive way to transform weak reductants into strong reductants in a thermodynamically favorable fashion. Such processes enable electrocatalytic transformations where a single electron or hole can drive multiple catalytic cycles.

References

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