

# Switchable singlet oxygen photoproduction in porphyrin-decorated bistable rotaxanes governed by molecular folding

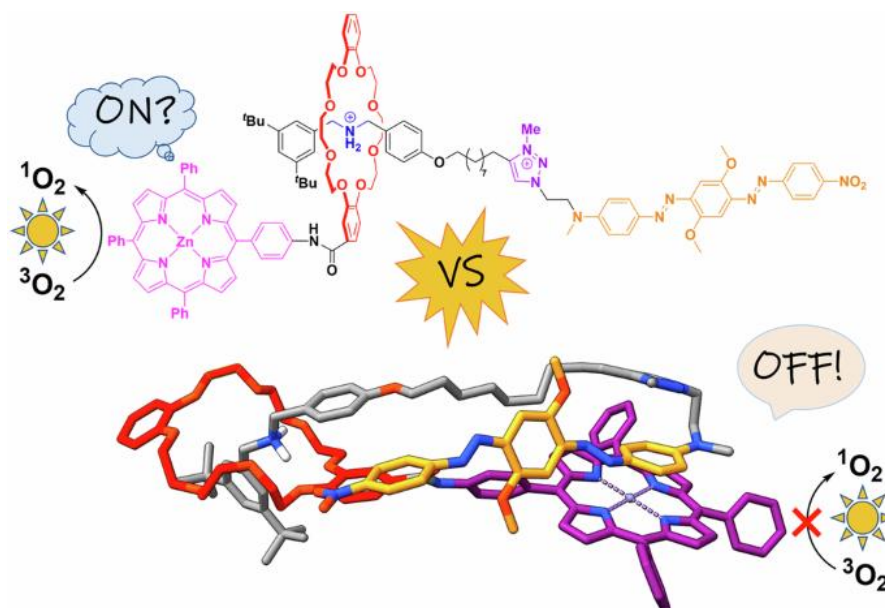
J. Riebe<sup>1</sup>, J. Niemeyer<sup>1</sup>

<sup>1</sup> Faculty of Chemistry (Organic Chemistry), University of Duisburg-Essen  
jan.riebe@uni-due.de

Controlling the photochemical generation of singlet oxygen is important for selectivity in both photodynamic therapy (PDT) and organic synthesis<sup>1</sup>.

Exploiting the special features of the mechanical bond (e.g. for switchable systems) is a novel strategy to influence the action of medically active compounds<sup>2</sup> and catalysts<sup>3</sup>. We designed a bistable [2]rotaxane incorporating a **Photosensitizer (PS)** and a **Quencher (Q)** (see Figure)<sup>4</sup> for stimuli responsive singlet oxygen production by controlling the **PS-Q** distance. Control-systems, detailed spectroscopic and theoretical investigations explain the observed switching behavior.

Building upon this concept, ongoing work is focused on utilizing a bistable-rotaxane platform for the detection of biologically relevant analytes, by modulation of the co-conformational equilibrium, which alters the fluorescence readout<sup>5</sup>.



1. I. Pibiri, S. Buscemi, A. Palumbo Piccionello, A. Pace, *ChemPhotoChem* 2018, **2**, 535.
2. J. Riebe, J. Niemeyer, *Eur. J. Org. Chem.* 2021, 5106.
3. C. Kwamen, J. Niemeyer, *Chem. Eur. J.* 2021, **27**, 175.
4. J. Riebe, B. Bädorf, S. Löffelsender, M. E. Gutierrez Suburu, M. B. Rivas Aiello, C. A. Strassert, S. Grimme, J. Niemeyer, *Commun. Chem.* 2024, **7**, 171.
5. J. Riebe, J. Niemeyer, unpublished results.