

# DEVELOPMENT OF A NEW SUPER-OXIDIZING PHOTOCATALYSTS AND THEIR APPLICATIONS IN C-H ACTIVATION REACTIONS VIA IDIOSYNCRATIC MECHANISTIC MODES

Jonas Žurauskas<sup>1</sup>, Gustautas Snarskis<sup>1</sup>, Barbara Chatinovska<sup>1</sup>, Paulius Vaickūnas<sup>1</sup>, Gediminas Kreiza<sup>1</sup>, Kęstutis Zakarauskas<sup>2</sup>, Edvinas Orentas<sup>1</sup>

<sup>1</sup>Vilnius University, Lithuania

<sup>2</sup>Lithuanian Energy Institute, Lithuania  
[edvinas.orentas@chf.vu.lt](mailto:edvinas.orentas@chf.vu.lt)

Novel photocatalysts and their reactivity are reported as super-oxidants. Important leap towards a new understanding of green, oxidant and metal-free C-H functionalizations methodology is presented. Specifically crafted photoactive scaffolds demonstrates unique nature-mimicking reactivity. Novel mechanism opens new reactivities in the realm of photoredox catalysis is deciphered and outlined from the first-principles and experimentally. Multifunctional molecular instrument is devised which encompasses previously disembodied processes in a serially coupled interdependent events. The main emphasis was to push the boundaries of photoredox catalysis towards extremities (increasing excited state oxidation potentials to the record-breaking values), atom economy, easy accessible photocatalyst with low molecular weight, new mechanistic mode. Despite several decades of research directed towards photocatalysts design, such a simple and such a profound detail was overlooked. Not only this is fascinating from the perspective of pure mechanistic standpoint but is also highly sought after by the industrial chemistry branches because it greatly reduces the expenses and costs associated with the production line. By applying the principle of Occam's razor and reducing the system to the smallest set of elements it was in principle possible to achieve multifunctionality. Looking from the perspective of the atomic economy this is the most demanded of type of reaction in the chemists' toolbox.

---