

# Bench-Stable Selenium Salts: Se(III) Chemistry and Organic Photocatalysis

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## Bench-Stable Selenium Salts: Se(III) Chemistry and Organic Photocatalysis

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This talk will provide an overview of the research carried out in our laboratory at the University of Vienna, moving from personal scientific fascinations<sup>[1]</sup> to the state of the art in organic chemistry, with particular emphasis on our group's first publications.<sup>[2,3]</sup>

Bench-stable salts are compounds that can be stored and handled without decomposition or unwanted reactivity – common examples include household sodium chloride. Their ease of use, affordability, and versatility make them central to chemical practice. In contrast, radicals – species with unpaired electrons – are typically transient and highly reactive, which complicates their use in synthesis and catalysis. For this reason, isolable radicals that remain stable under ambient conditions are especially valuable.

We have recently developed cationic selenuranes as bench-stable reservoirs of selenium radical cations, a class reagents that remains scarcely explored in organic chemistry.<sup>[4]</sup> These compounds can be prepared and isolated on multigram scale and exhibit remarkable stability. Under ambient conditions they can be stored for more than one month without requiring an inert atmosphere. A distinctive feature is their reversible head-to-head dimerization, which allows controlled Se(III) radical release in solution. Their reactivity spans oxidation and substitution chemistry with hydrazines, alcohols, sulfinates, borates, silanes, and stannanes, including applications to structurally complex substrates.

[1]. Mateos, J., Schulte, T., Behera, D., Leutzsch, M., Altun, A., Sato, T., Schnegg, A., Neese, F., Ritter, T. *Science*, **2024**, *384*, 446–452.

[2]. Zhiliaev, K., Maryasin, B., Kählig, H., Gil-Sepulcre, M., Mateos, J., *Angew. Chem. Int. Ed.* **2025**, e202513534.

[3]. Uipanit, S., Schreyer, T., Zhiliaev, K., Kaup, J-H., Natali, M., Mateos, J., *submitted manuscript*. Deposited in ChemRxiv: [doi: 10.26434/chemrxiv.15002075/v1](https://doi.org/10.26434/chemrxiv.15002075/v1).

[4]. Furukawa, N., *Bull. Chem. Soc. Jpn.* **1997**, *70*, 2571–2591

## Biography:



Javier was born and raised in Catalonia, Spain. He earned a BSc in Chemistry from the Universitat de Barcelona, specializing in Organic Chemistry (MSc). In 2017, he moved to Italy to pursue a PhD at the Università degli Studi di Padova, under the guidance of Prof. L. Dell'Amico. His doctoral research focused on unraveling the mechanisms of photochemical reactions and developing novel organic photocatalysts with balanced redox properties. After completing his PhD in early 2022, Javi relocated to Germany for postdoctoral studies at the Max-Planck-Institut für Kohlenforschung, where he joined Prof. T. Ritter's group. There, his research centered on leveraging widely available salts to address long-standing synthetic challenges, with a particular focus on nitrate reduction strategies for application in aryldiazonium chemistry. In October 2024, Javi began his independent career as a tenure-track assistant professor at the Institut für Organische Chemie, Universität Wien