

# PhD Fellowship

## Organoxenon Compounds for the Synthesis of Organotransition Metal Complexes in High Oxidation States

### Position

This position will be funded via a doctoral student scholarship of the Fonds der Chemischen Industrie, as part of the Liebig fellowship of the junior group located the Department of Chemistry of the Humboldt-Universität zu Berlin (Germany). The duration of the funded period is 3 years and the position is to be filled as soon as possible. More details can be found in the guidelines at <https://www.vci.de/fonds/stipendien/liebig-stipendium/seiten-2.jsp>.

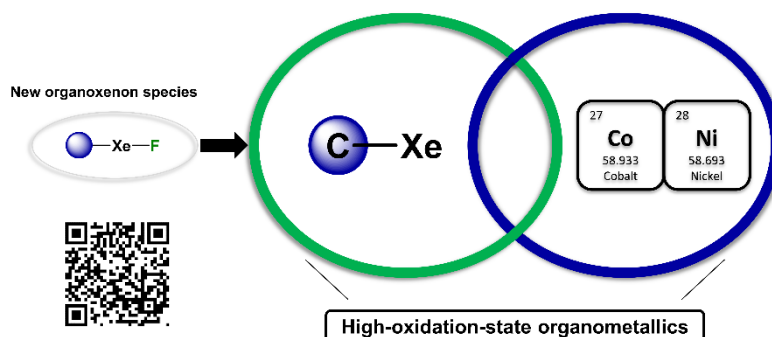
### Significance

The project merges the fields of noble gas chemistry and organometallic chemistry, in which fluorine chemistry plays a key role. In fact, it entails new concepts both in the reactivity of organoxenon compounds, as well as in the synthesis of organotransition metal complexes in high oxidation states (OS).

### Proposed research: Context and Objective

The synthesis of the first Xe compound by Bartlett in 1962 changed the paradigm of the inertness of noble gases.<sup>[1]</sup> In 1989, the synthesis of  $[\text{XeC}_6\text{F}_5]^+$  salts, the first species containing Xe–C bonds, was reported.<sup>[2]</sup> Since then, the field of organoxenon chemistry experienced a great development making many different species available,<sup>[3]</sup> yet their application in synthesis has been barely exploited.

The candidate will prepare known and new organoxenon compounds containing several types of organic groups with different degrees of fluorination and investigate their applicability as strong oxidizers for the synthesis of organometallic complexes in high OS (see Figure). This process will allow the coordination of the organic moiety to the metal center, which will be oxidized at the same time. The main target will be the study of 3d metals, especially cobalt and nickel, not only because they are of increasing interest in many catalytic processes, but also because the stabilization of their higher OS is more challenging than in their heavier homologues and therefore they have been far less studied.<sup>[4]</sup> The role of different ligands in the stabilization of high OS in these complexes will be investigated, as well as their potential implication in cross-coupling processes.



### Candidate Profile

The candidate must have a Master's degree in chemistry or a closely related field. Synthetic skills in inorganic and/or organometallic chemistry are required, ideally in handling sensitive substances, as well as experience with common characterization techniques (NMR, MS, IR, etc.), database searches (e.g. SciFinder, Google Scholar), ChemDraw and Microsoft Office programs. Experience in inorganic fluorine chemistry would be beneficial, but it is not required. High level of English is mandatory, whereas no command of German is required. The candidate should bring high motivation and teamwork skills, and be willing to learn new techniques!

### Application

Applications including a CV with two references, academic transcripts and a cover letter stating background, motivation and interest should be sent to Dr. Alberto Pérez-Bitrián ([alberto.perez-bitrian@hu-berlin.de](mailto:alberto.perez-bitrian@hu-berlin.de)).

### Selected references

[1] N. Bartlett, *Proc. Chem. Soc.* **1962**, 218.

[2] a) H. J. Frohn, S. Jakobs, *J. Chem. Soc., Chem. Commun.* **1989**, 625. b) D. Naumann, W. Tyrra, *J. Chem. Soc., Chem. Commun.* **1989**, 47.

[3] H.-J. Frohn, V. V. Bardin, *Organometallics* **2001**, 20, 4750.

[4] M. Malischewski, in *Comprehensive Organometallic Chemistry IV, Vol. 1* (Ed.: P. L. Holland), Elsevier, Amsterdam, **2022**, pp. 109–134.