Project 2.9. Transition metal-catalyzed C–H activation of nitrones

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Background:

- synthesis of the starting materials
- optimization and investigation of the scope of the title C–H activation reactions of nitrones
- preparation of scientific papers

Aim:

The aim of the project is discovery and development of transition metal-catalyzed C–H activation reactions of aldonitrones. These processes will involve cross-coupling with substrates containing good leaving groups (primarily halogens) at an sp^2 carbon (or C(sp^3), or a sulfur atom of sulphonyl group), leading to ketonitrones. The second objective is to develop double C–H activation (cross-dehydrogenative coupling, CDC)[1] reactions of aldonitrones, that is their oxidative cross-coupling with substrates containing a C(sp^2)–H bond.

Reactions involving C–H activation in one, or better both substrates, enable preparation of desired, complex target products more efficiently, that is in fewer synthetic steps. Such processes allow employing simpler, more available starting materials, as well as reduced consumption of resources (reagents, solvents, time, energy) and diminished production of waste products which are often dangerous to the natural environment. Development of a new class of such reactions with broad substrate scope will be the key result of the proposed research project. Considering the exceptional versatility of nitrones as synthetic intermediates, development of efficient, catalytic methods of their synthesis will undoubtedly contribute to the organic chemists' abilities to prepare complex nitrogen-containing organic compounds, such as unnatural aminoacids, biologically active alkaloids, heterocycles, aminosugars, pharmaceuticals, compounds exhibiting interesting physicochemical properties, etc.

Requirements:

- a MsC degree in chemistry obtained before 30th June 2020
- good knowledge of organic chemistry
- dedication to the project, interpersonal skills,
- good English skills, sufficient for research work in chemistry