

Title: **Approaches towards photochemical reactivity using organoiodanes and organo(trifluoro)borates.**

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Controlled photochemical generation of reactive radical species has become a powerful bond-forming tool in organic synthesis. In this project, we have performed initial and preliminary studies towards photochemical radical generation using the C-O bond of hypervalent iodine reagents. We also initiated a project (for the first time in the group) to carry out dual nickel/photoredox coupling of α -substituted C(sp³) trifluoroborates.

Studies towards hypervalent iodine compounds have been successfully realized. Focusing on the first goal, the generation and the controlled transfer of $\cdot\text{CF}_2\text{H}$ and $\cdot\text{CFH}_2$ radicals to C-H positions of activated heterocyclic substrates via homolytic I-O cleavage followed by decarboxylation process has been successfully carried out. Specifically, new hypervalent reagents have been designed and prepared in order to help prevent harmful radical side reactions.

In another iodane-based approach, the synthesis of 1,8-diiodonaphthalene by homolytic bond cleavage and later decarboxylation process was assayed. For comparison, the target compound was also obtained by the diazonium salt intermediate. The adaptation of the photochemical (diradical) route to a small-scale photoreactor has proven challenging and will be continued in the group.

The last goal which is the synthesis of two different Iridium photocatalyst to be applied in cross-coupling photo-redox reactions has been achieved. The photocatalyst synthesis has been successful realized in all steps, obtaining the desired pure catalysts as a crystalline yellow powder. On the other hand, the cross-coupling photo-redox products have not been obtained due to the air sensibility of the other photocatalyst used in this process, Ni(COD)₂. However, with the use of a more robust Ni complex (e.g. [glyme]NiCl₂), we anticipate that this final objective could be successfully achieved in the host research group.