# Breaking C–O and N–O Bonds: from the Reduction to the Synthetic Applications

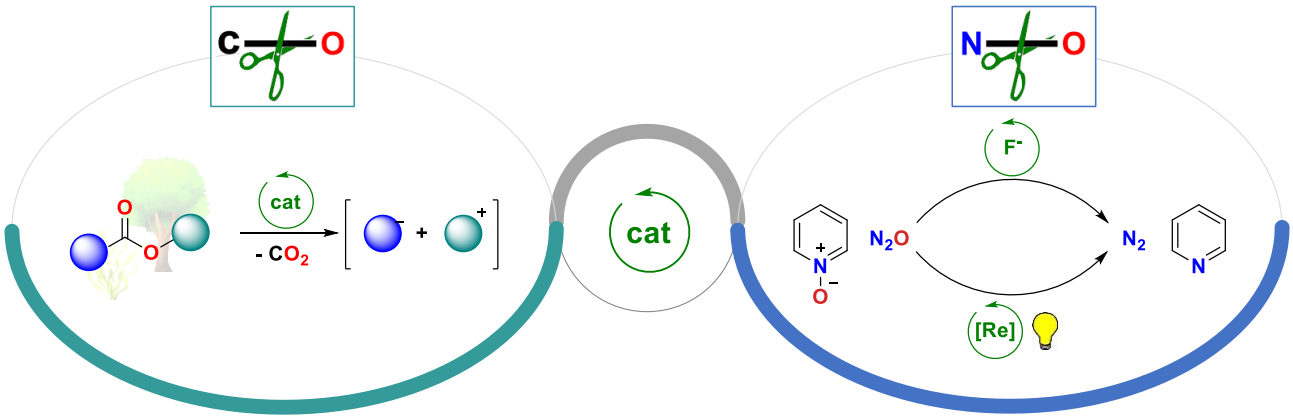
Lucile Anthore-Dalion

*NIMBE, CEA, CNRS, Université Paris-Saclay, 91191 Gif-sur-Yvette, France.*
*lucile.anthore@cea.fr*

Chemical commodities are today mainly produced through the oxidation of reduced species, e.g., fossil feedstock for carbon-containing compounds or ammonia for their nitrogen counterparts. In contrast, renewable feedstocks are highly oxidized molecules (biomass, waste chemicals, $CO_2$, nitrogen oxides…). Fostering a circular economy of the C and N cycles thus leads, chemically speaking, to rely on reducing steps. In this context, our group has focused on the catalytic conversion of oxygenated bonds, particularly C–O bonds, towards synthesizing valuable chemicals. A strong emphasis is placed on understanding the catalytic mechanisms at play.

Taking advantage of our knowledge of σ C–O bonds activation, we have recently shown that esters can be used as bifunctional reagents in decarboxylative reactions. The proof-of-concept was demonstrated with the transfer hydroalkylation of imines, where the formyl hydrogen behaved as a hydride.[1]

Additionally, our group has recently broadened its expertise to reduce other oxygenated bonds, mainly N–O bonds. We have thus reported new organo-[2] and photocatalytic[3] reduction strategies for deoxygenating $N_2O$ and organic *N*-oxides used as model molecules. In both cases, we have investigated the mechanistic features with experimental and computational tools. In particular, the photocatalytic process based on a rhenium catalyst was studied with the help of photophysicists.




[1] E. Crochet, L. Anthore-Dalion, T. Cantat, *Angew. Chem.* **2022**, *135*, e202214069.
[2] L. Anthore-Dalion, E. Nicolas, T. Cantat, *ACS Catal.* **2019**, *9*, 11563-11567.
[3] M. Kjellberg, A. Ohleier, P. Thuéry, E. Nicolas, L. Anthore-Dalion, T. Cantat, *Chem. Sci.* **2021**, *2021*, 10266-10272.