



HAL
open science

C02 and Biomass Conversion Using Organometallic Molecular Catalysts

T. Cantat

► **To cite this version:**

T. Cantat. C02 and Biomass Conversion Using Organometallic Molecular Catalysts. GEQO 2016, Sep 2016, Girona, Spain. cea-02351414

HAL Id: cea-02351414

<https://cea.hal.science/cea-02351414>

Submitted on 6 Nov 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

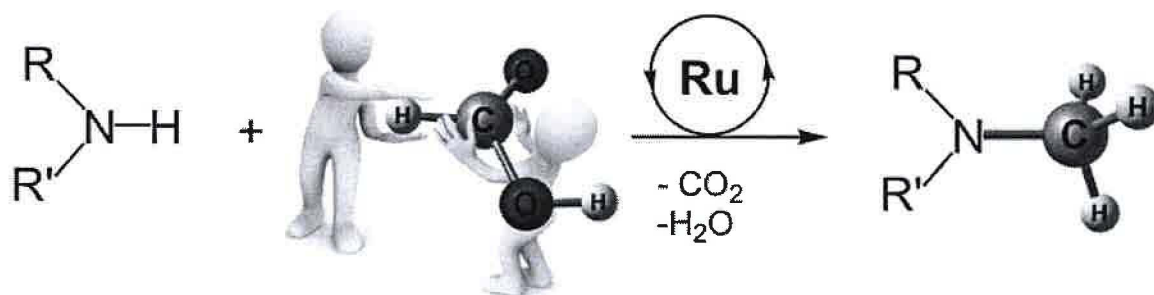
L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

CO₂ and Biomass Conversion Using Organometallic Molecular Catalysts

Thibault Cantat

CEA Saclay – Physical Sciences Division
DSM / IRAMIS / NIMBE UMR CEA/CNRS 3685
91191 Gif-Sur-Yvette Cedex, France
thibault.cantat@cea.fr

While greenhouse gases emissions are reaching alarming levels, fossil fuels still represent 80% of the world energy portfolio and 95% of our chemical commodities rely on non-renewable resources, namely hydrocarbons. In this context, utilizing CO₂ as a C₁ building block to produce platform chemicals as an alternative to petrochemistry has a double advantage of reusing CO₂ while sparing fossil resources and avoiding CO₂ emissions from their use. We have developed a strategy relying on the simultaneous use of a functionalizing reagent and a reductant that can be *independently* adjusted to perform the reductive functionalization of CO₂. The so-called *diagonal approach* will be discussed and exemplified with novel catalytic processes to convert CO₂ to formamides, N-heterocycles, methylamines and methanol, using hydroboranes, hydrosilanes or formic acid as reductants. These new catalytic reactions rely on the use of simple organocatalysts or Zn, Fe and Ru organometallic complexes. The mechanisms at play in these transformations will be presented, based on DFT calculations and isolation of reactive catalytic intermediates.[1-9]



- [1] Gomes, C. D.; Jacquet, O.; Villiers, C.; Thuery, P.; Ephritikhine, M.; Cantat, T. *Angew. Chem. Int. Ed.*, **2012**, *51*, 187-190.
- [2] Jacquet, O.; Gomes, C. D.; Ephritikhine, M.; Cantat, T. *J. Am. Chem. Soc.*, **2012**, *134*, 2934-2937.
- [3] Jacquet, O.; Frogneux, X.; Gomes, C. D.; Cantat, T. *Chem Sci*, **2013**, *4*, 2127-2131.
- [4] Pouessel, J.; Jacquet, O.; Cantat, T. *ChemCatChem*, **2013**, *5*, 3552-3556.
- [5] Jacquet, O.; Gomes, C. D.; Ephritikhine, M.; Cantat, T. *ChemCatChem*, **2013**, *5*, 117-122.
- [6] S. Savourey, G. Lefèvre, J.-C. Berthet, P. Thuéry, C. Genre, T. Cantat, *Angew. Chem. Int. Ed.*, **2014**, *53*, 10466-10470.
- [7] E. Blondiaux, J. Pouessel, T. Cantat, *Angew. Chem. Int. Ed.*, **2014**, *53*, 12186-12190.
- [8] Chauvier, C.; Tlili, A.; Gomes, C. D.; Thuéry, P.; Cantat, T. *Chem Sci*, **2015**, *6*, 2938-2942.
- [9] Cantat T. *et al.*, Patent applications n° WO 2012/137152, PCT/IB2013/054601, PCT/IB2013/054599, FR1259757, FR1352996