

# C-O Bond Cleavage in CO<sub>2</sub> and Biomass Products Using Organometallic Molecular Catalysts

T. Cantat

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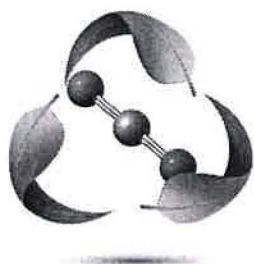
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## C–O Bond Cleavage in CO<sub>2</sub> and Biomass Products Using Organometallic Molecular Catalysts

T. Cantat\*

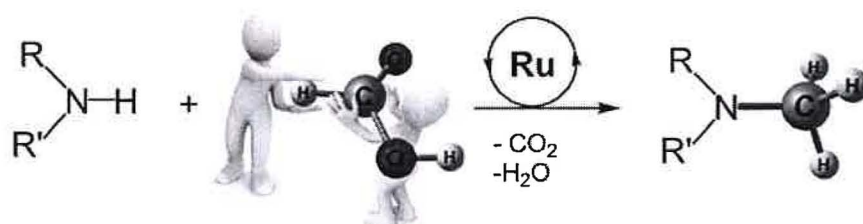
NIMBE, CEA, CNRS, Université Paris-Saclay, Gif-sur-Yvette, France



With 95 % of organic chemical commodities deriving from fossil resources, the chemical industry is currently exploring novel and renewable carbon feedstocks for the production of both bulk and fine chemicals. In this context, the utilization of CO<sub>2</sub> or products derived from biomass wastes is an attractive strategy to access value-added products. Because these carbon sources feature carbon atoms in an

oxidized state, the development of reduction methods is needed and they call for the design of efficient catalysts able to break strong C–O and C=O bonds.

Over the last years, our group has developed novel catalytic reactions for the conversion of CO<sub>2</sub> to formamides, N-heterocycles, methylamines and methanol, using hydroboranes, hydrosilanes or formic acid as reductants.<sup>1-8</sup> In parallel, we have developed an unprecedented strategy to isolate simple aromatics, in a pure form, from natural lignin in 15 different wood species.<sup>8-9</sup> These new catalytic transformations 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.



**Figure 1** Methylation of amines with formic acid as carbon and hydrogen source

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