

HETEROBIMETALLIC COMPLEXES FOR COOPERATIVE REACTIVITY

Clément CAMP¹

¹ Laboratory of Catalysis, Polymerization, Processes and Materials UMR 5128, CNRS, CPE-Lyon, UCBL, Villeurbanne, France
clement.camp@univ-lyon1.fr, <https://www.cp2m.org/>

Keywords: Heterobimetallic complexes; Surface Organometallic Chemistry, Catalysis, C-H activation

Summary: One of the current frontiers in organometallic catalysis is to study the combined action of two metal centers to promote novel modes of reactivity, where the two metal centers act in synergy, in order to access a chemistry not possible with monometallic species. The association of electron-rich late metal centers (such as iridium), with Lewis acidic metals (such as aluminium, hafnium or tantalum) is particularly interesting to create polarized metal-metal pairs presenting original electronic structures,^[1,2] and thus potentially novel reactivity. Most systems associating early and late transition metals developed to date feature bulky ligands in order to stabilize such heterobimetallic edifices, but most of the time prevent substrates to bind across the two metals, which could explain why catalytic applications of these heterobimetallic complexes are limited at the moment. Surface Organometallic Chemistry (SOMC) allows the isolation of highly unsaturated metal species featuring unique reactivity, and is an attractive approach to overcome this limitation. Recently, we have shown that these polarized heterobimetallic pairs are able to activate carbon dioxide (Fig. 1a)^[3] as well as C-H bonds (Fig. 1b)^[4-7] in a concerted way on both metal centers, which explains why these bimetallic systems have a catalytic activity largely superior to their monometallic analogues. In this presentation we will describe our latest results in this area of research.

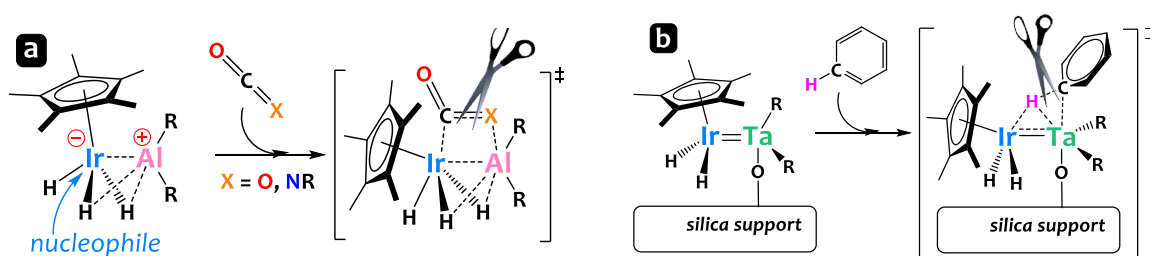


Fig. 1 Reactivity of heterobimetallic complexes for the activation of CO₂ or C-H bonds by original cooperative mechanisms across the two metals.

References:

1. Escomel, L.; Soulé, N.; Robin, E.; Del Rosal, I.; Maron, L.; Jeanneau, E.; Thieuleux, C.; Camp, C. *Inorg. Chem.* **2022**, *61*, 5715-5730.
2. Lassalle, S.; Petit, J.; Falconer, R. L.; Héroult, V.; Jeanneau, E.; Thieuleux, C.; Camp, C. *Organometallics* **2022**, *41*, 1675-1687.
3. Escomel, L.; Del Rosal, I.; Maron, L.; Jeanneau, E.; Veyre, L.; Thieuleux, C.; Camp, C. *J. Am. Chem. Soc.* **2021**, *143*, 4844-4856.
4. Lassalle, S.; Jabbour, R.; Schiltz, P.; Berruyer, P.; Todorova, T. K.; Veyre, L.; Gajan, D.; Lesage, A.; Thieuleux, C.; Camp, C. *J. Am. Chem. Soc.* **2019**, *141*, 19321-19335.
5. Lassalle, S.; Jabbour, R.; Del Rosal, I.; Maron, L.; Fonda, E.; Veyre, L.; Gajan, D.; Lesage, A.; Thieuleux, C.; Camp, C. *J. Catal.* **2020**, *392*, 287-301.
6. Del Rosal, I.; Lassalle, S.; Dinoi, C.; Thieuleux, C.; Maron, L.; Camp, C. *Dalton Trans.* **2021**, *50*, 504-510.
7. Escomel, L.; Abbott, D. F.; Mougél, V.; Veyre, L.; Thieuleux, C.; Camp, C. *Chem. Commun.* **2022**, *58*, 8214-8217.