

DEPARTMENT OF MOLECULAR SCIENCE AND NANOSYSTEMS

Seminars of the PhD Programme in Chemistry



Università
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Venezia

Design and Applications of Catalytic Reactions for Sustainable Synthesis and Energy

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**the event will be transmitted in video conference mode at 16:00 in
Room Delta2A - Scientific Campus - via Torino 155, Venezia Mestre**

Abstract

The design of "green" synthetic methodology and new approaches to sustainable energy are major goals of modern catalysis. Traditionally, catalysis by metal complexes has been based on the reactivity of the metal center, while the ligands bound to it influence its reactivity, but do not interact directly with the substrate. In recent years, complexes based on "cooperating" ligands were developed, in which both the metal and a ligand undergo bond making and breaking in key steps of catalytic cycles, thus providing exciting opportunities for catalytic design. We have developed a new mode of metal-ligand cooperation, involving ligand aromatization – dearomatization, which provides a new approach to the selective activation of chemical bonds. Pincer-type complexes of several transition metals exhibit such cooperation, leading to fundamentally new, sustainable catalytic reactions, including several reactions which either produce hydrogen or consume it. Applications in environmentally benign organic synthesis, advanced biofuels, and hydrogen carriers will be described.

References:

1. Gunanathan, C.; Milstein, D. *Accs. Chem. Res.* **2011**, *44*, 588
2. Gunanathan, D.; Milstein D. *Science*, **2013**, *341*, 1229712 (review)
3. Balaraman, E.; Khaskin, E.; Leitun, G.; Milstein, D.; *Nature Chem.* **2013**, *5*, 122
4. Khusnutinova, J.; Milstein, D. *Angew. Chem. Int. Ed.* **2015**, *54*, 12236 (review)
5. Zell, T. Milstein, D. *Accs. Chem. Res.* **2015**, *48*, 1979
6. Hu, P.; Fogler, E.; Diskin-Posner Y.; Iron, M.; Milstein D. *Nature Comm.* **2015**, *6*, 6859
7. Xie, Y.; Ben-David, Y.; Shimon, L. J. W.; Milstein D. *J. Am. Chem. Soc.* **2016**, *139*, 9077

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