WITH A LITTLE HELP FROM MY FRIENDS – THE IMPORTANCE OF LIGANDS AND SUPPORTS FOR SUSTAINABLE CATALYSIS

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The cost-effective and waste-free synthesis of materials, life science goods and all kinds of organic products require efficient chemical transformations. In this regard, development of more active and selective catalysts constitutes a key factor for achieving improved processes and providing the basis for a sustainable chemical industry. Despite continuous advancements in all areas of catalysis, still organic syntheses as well as the industrial production of most chemicals can be improved significantly in terms of sustainability and efficiency.[1]

In the talk, the development of novel palladium catalysts for carbonylation reactions will be shown.[2] Specifically, the role of ligands in carbonylations of olefins will be addressed. By rational design novel ligands and complexes have been synthesized, which allow for unprecedented efficiency in such transformations by following the principles of cooperative catalysis.[3]

Apart from industrially relevant processes, interesting carbonylation reactions for modern organic synthesis are presented.

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[1] Li H, Dong K, Jiao H, Neumann H, Jackstell R, and **Beller M**, *NATURE CHEMISTRY*, **2016**, 8, 1159-1166. The scope and mechanism of palladium-catalysed Markovnikov alkoxycarbonylation of alkenes.

[2] Dong K, Fang X, Guelak S, Franke R, Spannenberg A, Neumann H, Jackstell R, and **Beller M**, *NATURE COMMUNICATIONS,* **2017,** *8,* 14117. Highly active and efficient catalysts for alkoxycarbonylation of alkenes.

[3] Liu J, Wei Z, Jiao H, Jackstell R, and **Beller M**. *ACS CENTRAL SCIENCE*, **2018,** *4*, 30-38. Toward Green Acylation of (Hetero)arenes: Palladium-Catalyzed Carbonylation of Olefins to Ketones.

[4] Yang J, Liu J, Neumann H, Franke R, Jackstell R, and **Beller M**, *SCIENCE,* **2019,** *366,* 1514-1517; Direct synthesis of adipic acid esters via palladium-catalyzed carbonylation of 1,3-dienes.