Original non-noble metal nanoparticles and structurally simple complexes as promising catalysts for olefin hydrosilylation reactions.

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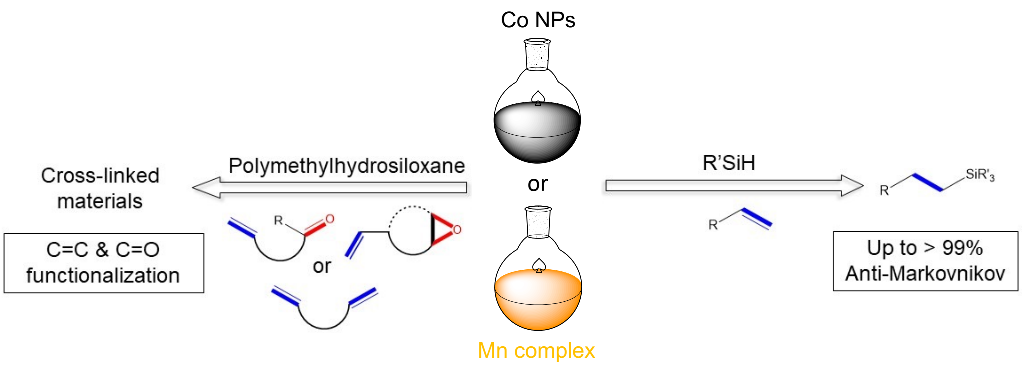
Alkene hydrosilylation is a key reaction for the preparation of silicones and functional silanes. Currently, unsustainable platinum-based complexes are still preferred in the industry and although ppm levels of catalyst are used, the difficulty to remove Pt from the reaction products leads to extra costs. One current major trend in this field is thus to replace platinum with non-noble metal species. Consequently, in recent years, a major effort has been dedicated to the development of first-row transition metal complexes as catalysts for olefin hydrosilylation. In this context, our group has investigated the use of metallic nanoparticles as alternatives to Pt or to non-noble metal complexes. We have shown the possibility to use original non-noble metal NPs based on Ni, Fe and more recently on Co as catalysts.[1-3] The Co NPs demonstrated high activity when used at 30 °C, yielding exclusively the anti-Markovnikov product. Additionally, we demonstrated the possibility of using UV irradiation to further activate these cobalt NPs to enhance their catalytic performances.[3] Because of our interest in non-noble metal hydrosilylation catalysts, we recently focused our attention on manganese, which is the third most abundant transition metal in the earth's crust, and which is considered as non-toxic. In this context, we demonstrated that commercially available and structurally simple Mn complexes were very promising catalysts for the regioselective hydrosilylation of various alkenes under UV irradiation[4] or thermal conditions[5] with Mn loadings as low as 1 mol%, in the absence of additives and with excellent selectivity and yields. These complexes were successfully employed in olefin hydrosilylation reactions using functional olefins and industrially relevant silanes and polymethylhydrosiloxanes.[4,5] Our most recent catalytic system was found to tolerate unpurified substrates and could be used in green solvents under air, selectively yielding the anti-Markovnikov hydrosilylated products at 70 °C using 2 mol% of catalyst.[5]



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