Ligand-capped nanocatalysts: surface study and applications in hydrogenation reactions

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Ligands such as phosphines and phosphites have been extensively and successfully used in homogeneous catalysis due to their rich coordination chemistry and their influence on the stability and selectivity of transition metal catalysts.[1] More recently, such ligands also revealed to efficiently stabilize transition metal nanoparticles (NPs) that are active catalysts in several processes such as arene hydrogenation, semi-hydrogenation of alkynes, etc...[2] In heterogeneous catalysis, however, the tuning of the catalyst is usually attempted through the use of additives but remains mainly dependent on the size of the particles. In view of the potential of metal nanoparticles in catalysis, there is a need for a better understanding how the ligands stabilise the NPs and affect their surface properties.

In this work, phosphorus and NHC ligands are utilized for the stabilization of Rh[3] and Pd[4] NPs and the tuning of their catalytic performance in hydrogenation reactions. H/D exchange reactions and DFT calculations are also included to obtain further insights into the influence of these ligands.

References

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Biography

Cyril Godard received his Ph-D degree in in Inorganic Chemistry from the University of York, UK, in 2004 under the supervision of Profs. R. Perutz and S. Duckett for his work on bond activation reactions at Rh cyclopentadienyl complexes. After a postdoctoral position in York working on Para-Hydrogen Induced Polarisation techniques, he was awarded the Juan de la Cierva Fellowship in 2006 and the Ramon y Cajal fellowship in 2009 at the Universitat Rovira i Virgili in Tarragona, Spain, where he is currently associate professor in Inorganic Chemistry. His research interests lie in the areas of homogeneous catalysis and application of transition metal nanoparticles in catalysis. He is currently the co-author of 87 scientific articles in international journals and 9 book chapters (h-index = 29).