Facile synthesis of NHC-stabilized Ni nanoparticles and their catalytic application in selective hydrogenations

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Metal nanoparticles (M-NPs) combine advantages of both homogeneous and heterogeneous catalysts, namely high activity /selectivity and facility for recycling and re-use. To enhance their catalytic performance, it is necessary to induce control on the physical and chemical properties of the M-NPs. Previously, we have demonstrated that strongly-coordinating ligands are able to efficiently induce this control.[1] Here, we present a new and facile procedure to synthesize metal NPs stabilized by strongly coordinating N-heterocyclic carbene (NHC) ligands. To date, similar NHC-stabilized NPs were prepared by complicated multi-step synthesis and required the use of strong bases. Our approach is one pot procedure involving in-situ generation of free NHC-ligands through decarboxylation of 1,2-dimethylimidazolium-2-carboxylate (Me_2Im-CO2) under M-NPs preparation reaction conditions. This new methodology has been successfully applied preparation of colloidal and immobilized Ni-NPs.[2] The catalytic performance of these materials on selective hydrogenations has been evaluated.

References

[1] Llop, J; Szeto, K. C.; Barakat, W.; Merle, N.; Godard, C.; Taoufik, M.; Claver, C. Chem. Commun., 53 (2017) 3261.
[2] Díaz de los Bernardos, M; Pérez-Rodríguez, S; Gual, A; Claver, C; Godard, C. Chem. Commun., 53 (2017) 7894.

Figures

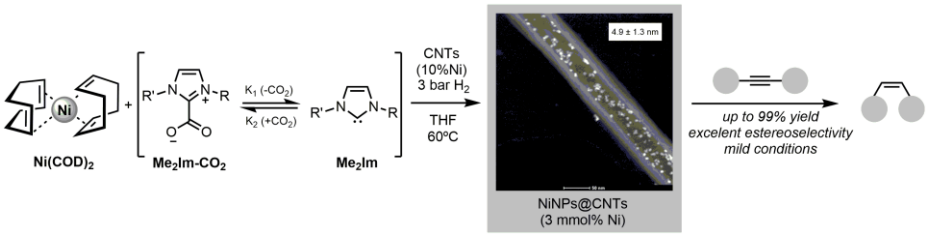

Figure 1: Synthesis NHC-stabilized metal nanoparticles and catalytic application in selective hydrogenation.

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