5-Barb-imidazo[1,5-a]pyridin-3-ylidene (Barb-IPy)⁻: A novel class of anionic, L-shape (chiral) N-Heterocyclic Carbenes for (asymmetric) gold(I) and gold(III) catalysis

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Over the last two decades, gold catalysis has gained a considerable significance in the field of organic synthesis since it comprises atom-economic and highly efficient processes for the transformation of relatively simple substrates into valuable, highly complex molecular architectures.¹

More recently, the use of hemilabile bidentate ligands based on (P,N) or (NHC-N) ligands have been introduced and appeared as a very promising strategy to access new reactivities by stabilizing highly reactive intermediates or by allowing elementary Au(I)/Au(III) redox processes.²,³,⁴ In this context, we were interested in the development of the new class of anionic, L-shape N-Heterocyclic Carbenes 1⁻Li, based on the rigid imidazo[1,5-a]pyridin-3-ylidene (IPy) platform and exhibiting an anionic, potentially coordinating malonate unit in close proximity to the gold center. This specific design would favor electronic interactions between the anionic heterocycle and the gold center, to a net formation of carbon-gold coordination bond, in the case of a highly electron-demanding gold center.

In this communication, we report the highly modular synthesis towards the (chiral) precursors 5-barb-imidazo[1,5-a]pyridinium (1·H), the generation of the free, stable and anionic carbenes 1⁻Li and their coordination chemistry towards gold(I) and gold(III) centers, as well as the implementation of the precatalysts [(1)AuCl](Q) and (1)AuCl₂ in gold-catalyzed reactions.

References

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