Recent Advances in Carbene Chemistry:
Concepts and Applications

Alois Fürstner

Max-Planck-Institut für Kohlenforschung, D-45470 Mülheim/Ruhr, Germany
fuerstner@kofo.mpg.de

This lecture intends to showcase some unconventional ways of harnessing the reactivity of alkynes
via highly selective metal-catalyzed transformations. After a short review of our work in the area of
triple bond metathesis, some unorthodox addition reactions to internal alkynes will be discussed in
detail.

The use of carbophilic Lewis acids based on gold, platinum or rhodium provides many opportunities
for the selective functionalization of triple bonds. Although it is well accepted that the reactions
usually proceed via metal carbene intermediates, the actual nature of such species was subject to
speculation. Only recently has our group managed to isolate reactive carbenes of gold and rhodium.
The structural features of these species and the preparative implications will be discussed in some
detail.

Moreover, unprecedented ruthenium-catalyzed trans-hydrogenation, trans-hydroboration and trans-hydrostannation reactions will be presented. These unconventional transformations are also thought
to proceed via metal-carbene intermediates, some of which have also been isolated and fully
characterized. Selected applications to target-oriented synthesis are meant to showcase the current
state of development.