Syntheses of 'P' and 'Al' Based Homoatomic Double Bonded Compounds for Small Molecules Activations

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Multiple-bonded molecular main group chemistry has rapidly developed since the isolation of the first stannylene (Sn=Sn) by Lappert in 1976[1] and disilene (Si=Si) by West.[2] In recent years, a plethora of heteroleptic and homoleptic double-bonded compounds has emerged, stabilized through the strategic use of sterically demanding ligands for kinetic stabilization and/or suitable N-heterocyclic carbene ligands for electronic stabilization.[3] The fundamental advances in main-group multiple bonds have now led to the exploration of this chemistry for sigma bond activation and catalysis which are more common with transition metals.[4]

In this talk, I will discuss the mimicking of transition metal properties by diphosphene (P=P) and dialumene (Al=Al) compounds. In particular, I will emphasize how the coordination of a carbene with diphosphene enhances its reactivity as well as how the carbene-coordinated diphosphene stabilizes coinage metal hydride.[5,6]

In the realm of aluminum chemistry, I will demonstrate how modifications to the ancillary ligands surrounding the aluminum center can yield diverse dialane systems, and how these systems can be employed to activate small organic molecules.[7,8]

References:

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