How low can you go?
Reactivity investigations with highly unsaturated metal complexes

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How low can you go? Reactivity investigations with highly unsaturated metal complexes

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Our research group have been particularly interested in the use of highly encumbering *m*-terphenyl ligands (2,6-$Ar_2C_6H_3^-$) to stabilise highly sterically and electronically unsaturated first-row transition metal complexes. These compounds are not only of significant interest from a structure and bonding perspective, but they are also highly reactive to small molecules in stoichiometric reactions and in catalysis, giving novel reaction pathways and products.[1]

Examples of stoichiometric reactions are the cleavage and homologation of carbon monoxide at room temperature and pressure to afford novel squaraines where the C_4 core is derived completely from CO,[2] the synthesis of clusters through reaction with "GaI"[3] and in the synthesis of families of Group 11 complexes featuring metallophilic interactions.[4]

These transition metal complexes are also precatalysts for a growing number of reactions, such as cyclotrimerisation, hydroelementation and dehydrocoupling,[5-8] affording new selectivities and products. We are also investigating improvements in the sustainability of certain processes through the development of solvent-free methodologies.

During my talk, I will discuss these results and others, demonstrating some of the unique reactivity of low-coordinate transition metal organometallics, with a bit of main group chemistry thrown in for good measure.

References

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Deborah Kays received her MChem and PhD degrees in Chemistry from Cardiff University, Wales. After postdoctoral work, also at Cardiff University, she took up a Junior Research Fellowship at the University of Oxford. She has been at the University of Nottingham since 2007, as Lecturer in Inorganic Chemistry, where she was promoted to Associate Professor in 2014 and to Professor in 2019.

Her research interests involve the investigation of the stabilisation of highly unsaturated complexes, their bonding and reactivity under stoichiometric and catalytic regimes. For her contributions to low-coordinate transition metal chemistry, she was awarded the 2018 Chemistry of the Transition Metals Award from the Royal Society of Chemistry.