Organometallic Reaction Chemistry (and Catalysis) in the Solid–State

Organometallic Chemistry is dominated by structures, transformations and catalysis that occur in the solution phase. However, this is not always the most desirable phase to operate in. For example: when catalysis requires separation of catalyst and substrates/products, selectivity in transformations that is promoted by solid–state effects is required, when solvent reacts unfavorably with the metal complex or when the host–guest properties of crystalline lattices encourage the formation of complexes that are difficult to prepare in solution phase.

This talk will outline our recent investigations that explore whether similar organometallic structures, transformations and catalysis can occur in the solid–state, when compared to the analogous solution–phase chemistry, using group 9 (Rh and Ir) phosphine complexes. It will demonstrate, by comparison with solution–phase chemistry, that C–H, C–Cl activation, C–C bond formation and activation can all occur in the solid–state. Furthermore we discuss the characterisation of interesting intermediates in these transformations that invoke sigma interactions between the organic fragment and the metal centre: C–H alkane complexes and C–C sigma complexes.