

Chemistry of phosphorus compounds: Options are endless

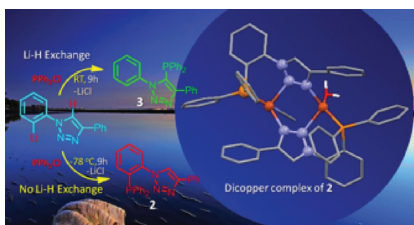
The research in our laboratory is focused on designing and developing novel, inexpensive and stable phosphorus based compounds to study their organometallic chemistry and explore their catalytic and medicinal applications. Our group is also focusing on designing multifunctional phosphorus based ligands for making homoleptic soft-soft metal-organic frameworks for catalytic, material and photophysical applications.

One of the research projects is concerned with the four-membered saturated inorganic ring system called cyclodiphosphazanes, which essentially act as mono- or bidentate ligands toward transition metals. Derivatives of cyclodiphosphazanes containing oxygen, sulphur, phosphorous or nitrogendonor-functionalities have shown versatile coordination behaviour, resulting in simple mononuclear to tri-, tetra- or polynuclear complexes and, 1D, 2D and 3D coordination polymers. Copper(I) and gold(I) complexes containing carefully tuned cyclodiphosphazane derivatives have proved to be potential anticancer agents showing remarkably high anti-proliferative

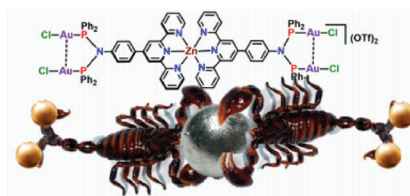
activity compared to cis-platin, currently used as a anti-tumor drug. Recently we succeeded in making first of its kind, novel metal organic frameworks containing soft-metalocene based cyclophosphazanes and soft-copper(I) ions with rich photophysical, material and catalytic properties. At present, we are designing many such soft-homoleptic molecules with sodalite type structures.

Another system under investigation is aimed at making hybrid ligands containing at least one trivalent phosphorus atom along with olefins, nitrogen, oxygen or sulphur donor atoms for hydroformylation and carbonylation reactions.

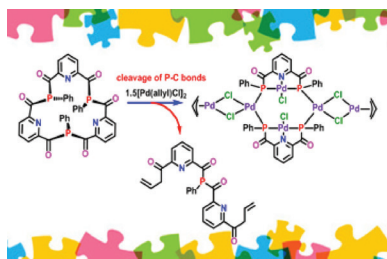
Our research group is also involved in designing ambidentate phosphorus based ligand systems to general iron, cobalt and nickel based pincer complexes to utilise them in organic synthesis and material applications. Under this scheme, several multifunctional phosphorus based ligands have been synthesised and their chemical reactivity and applications are being studied.



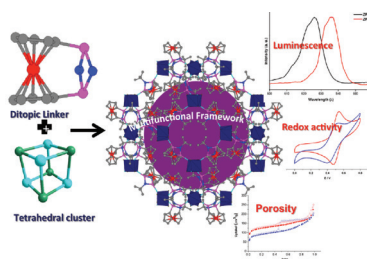
Triazole based phosphines and a copper complex for catalytic applications



Zn-Gold complex of bisphosphine-terpyridine hybrid ligand with excellent photo-physical properties



First example of triphosphametacyclophane and its hexapalladium complex



Cyclodiphosphazane and Cu₄I₄ based novel metal organic framework having sodalite topology