**Concise catalytic synthesis of (hetero)aromatic compounds**

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The major research themes in our laboratory are to develop metal- and organo-catalyzed synthetic routes to afford functionalized small molecules and to apply synthetic fine chemicals in rechargeable battery systems. Issues of regiochemistry, oxidation state changes of transition metal complexes, and efficiency to construct carbon–carbon and carbon–heteroatoms have been the central topics of our synthetic approaches.

C–H arylation potentially provides a concise synthetic strategy while eliminating the need for pre-functionalization of substrates. However, precise control of the site-selectivity and multiple catalytic cycle operations are hurdles to step-efficient access to honeycomb lattice segments. The Hong group disclosed palladium-catalyzed 2-fold C–H activation approaches to afford functionalized triphenylene frameworks from DG-bearing arenes. This method offers a distinct platform for one-step annulative pi-extension (APEX) by employing cyclic diaryliodonium reagents.

The Hong group developed the first nickel-catalyzed azide–alkyne cycloaddition (NiAAC) to directly access 1,5-disubstituted 1,2,3-triazoles at room temperature under aqueous/aerobic conditions. The choice of nickelocene precatalyst and Xantphos ligand were critical to allow high yield, excellent regioselectivity, a broad substrate scope, and excellent functional group tolerance.