Transition-Metal-Catalyzed [2+2+2] Cycloadditions for Carbocycle Synthesis

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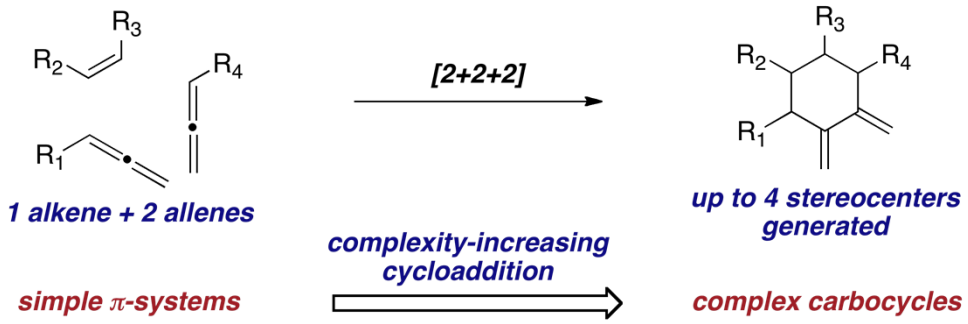

The development of fundamentally new complexity-increasing reactions is a paramount goal of modern organic synthesis, as chemists strive to develop step-economical or "greener" syntheses of complex targets. Multicomponent [*m*+*n*+*o*]-type cycloadditions offer the potential for the rapid generation of molecular complexity through the formation of multiple σ-bonds and sp^3-hybridized stereocenters in a single reaction step. We have developed a new class of complexity-generating transition-metal-catalyzed [2+2+2] cycloadditions of easily accessible π-systems delivering complex carbocycles for applications in chemical synthesis. These complexity-generating reactions construct important classes of fused carbocycles with levels of efficiency unmatched by current synthetic protocols, providing fundamentally new strategic choices for the rapid construction of stereochemically-dense carbocycles, including those present in many classes of bioactive, complex natural products and small molecules.