

# Understanding the reaction mechanism of C-C coupling reactions via Photoredox catalysis

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C-C coupling reactions are one of the most important classes of chemical transformations in organic chemistry, ranging from Glasser coupling to Nobel Prize (2010) winning Pd catalysed cross-coupling reactions. Due to its chemo, and regioselectivity this strategy is heavily used in industry, drug molecule synthesis, and in laboratories for catalysis purposes. The major drawback is the use of Transition metal, organic solvents, and other functionalized reactant partners. In this context Photoredox catalysis opens up a new area, where visible light can be used to form C-C bonds, without using the above-mentioned chemicals required. However, with these light-activated systems also the mechanistic understanding of the reaction mechanism of the C-C coupling reaction is not well documented in the literature. Hence in my talk, we are addressing the mechanistic investigation of C-C coupling reactions with two different types of Photoredox catalysts. In the first part, we will use phenylacetylene derivatives as a substrate to show that light-mediated homo C-C coupling reactions are feasible inside a water-soluble nanocavity via a host-guest charge transfer paradigm. Characterization of the photoproducts via analytical techniques e.g., NMR, GCMS, LCMS, and optical signatures of intermediates were tracked by Transient absorption spectroscopy. In the second part of the talk, we will be looking into optical signatures of transient intermediates of a Phenalene-based catalyst for hetero C-C coupling of Styrene with EDA derivatives.