BIOINSPIRED RADICAL REACTIONS ENABLED BY PORPHYRINOIDS

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„Do as nature, work as nature, and produce as nature" (Bao-Lian Su)

Porphyrinoids, also known as *the pigments of life,* are a class of naturally occurring organic dyes. They play key roles in crucial processes that support life - oxygen transport (hem), electron transport (cytochrome c), photosynthesis (chlorophyll a), and synthesis of DNA (vitamin B_{12}). Vitamin B_{12} - a co-factor in many catalytic processes. Following nature, we have been exploiting the potential of this compounds in catalysis.

This presentation will highlight a successful application of porphyrins as photoredox catalysts for visible light induced selective functionalizations. These compounds are effective in catalyzing C-C bond forming reactions involving the reductive or oxidative quenching.[1-3]

We have also proposed vitamin B_{12} photochemical activation in bond forming and cleavage reactions.[4-5] Along this line, we have developed new vitamin B_{12}-catalyzed reactions involving reduction of Co(III) to Co(I) or Co(II) and subsequent reactions with electrophiles or radicals. Vitamin B_{12} derivative unusually catalyzes a new olefinic sp_2 C-H alkylation reaction with diazo reagents as a carbene source,[5] acylation of activated olefins,[6] alkylation of strained molecules.[7-9] These key findings emphasize the unique feature of vitamin B_{12} as a catalyst to achieve something unachievable with other methodologies or to find a greener approach.

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