

## 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<sub>12</sub>). Vitamin B<sub>12</sub> - a co-factor in many catalytic processes. Following nature, we have been exploiting the potential of these 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.<sup>1-3</sup>

We have also proposed vitamin B<sub>12</sub> photochemical activation in bond forming and cleavage reactions.<sup>4-5</sup> Along this line, we have developed new vitamin B<sub>12</sub>-catalyzed reactions involving reduction of Co(III) to Co(I) or Co(II) and subsequent reactions with electrophiles or radicals. Vitamin B<sub>12</sub> derivative unusually catalyzes a new olefinic sp<sup>2</sup> C-H alkylation reaction with diazo reagents as a carbene source,<sup>5</sup> acylation of activated olefins,<sup>6</sup> alkylation of strained molecules.<sup>7-9</sup> These key findings emphasize the unique feature of vitamin B<sub>12</sub> as a catalyst to achieve something unachievable with other methodologies or to find a greener approach.

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