Investigating the Photophysical Properties of Silicon Phthalocyanines for Photocatalytic Organic Transformations

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Abstract: Photocatalysis has become a major focus as a sustainable pathway for chemical reactions with visible light photocatalysts performing a large range of reactions such as redox reactions, cyclization reactions, and energy transfer reactions. Silicon pthalocyanines (SiPcs) (Figure 1) have been largely ignored as photosensitizers in photocatalytic reactions, despite their low energy excitation, long triplet lifetimes, and their ability to form singlet oxygen. Using cyclic voltammetry and Stern Volmer quenching studies, we have shown SiPcs are capable of acting as electron donors or acceptors with appropriate substrates. We have successfully used a SiPc catalyst in a reductive quenching reaction where Hünig's base served as a sacrificial electron donor. In addition to being redox-active, our preliminary data also shows SiPcs are capable of performing energy transfer reactions, by performing a reaction that utilizes singlet oxygen as a reactant. These reactions, as well as the photophysical and electrochemical experiments will be presented.

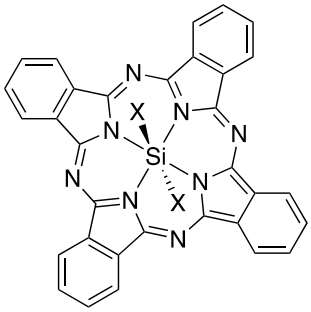

Figure 1: Substitution sites on silicon phthalocyanines