Highly Efficient Quantum Dots for Alkyl Radical Generation

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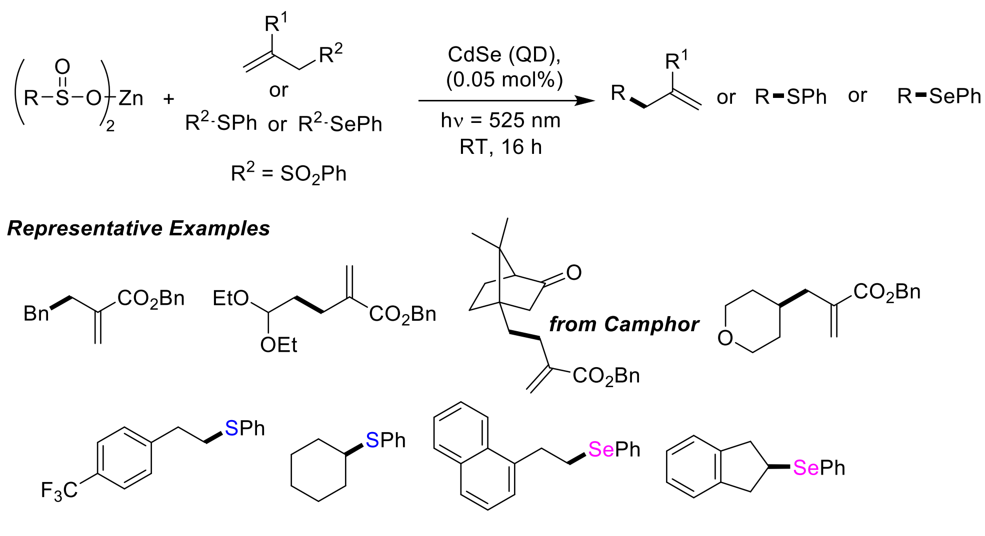
Quantum Dots (QD) are semiconducting materials in nanometer-sized with defined composition, shape, and size.[1] QD's are typically composed of inorganic core made up of hundreds to thousand atoms. In recent years photoredox catalysis[2] has emerged as powerful strategy for small molecules synthesis and late-stage functionalization under relatively mild reaction conditions. However, photocatalyst used are complexes of expensive and rare earth metals which operates under homogenous conditions and typically not ideal for large-scale industrial application.[3] Thus, other alternative for abundant material as photocatalyst has attract synthetic chemist to develop versatile materials to perform photoredox reactions with additional features of recyclability. In present study we have utilized CdSe QD as photocatalyst to oxidize wide range of zinc alkyl sulfinates[4] under photoredox condition generating alkyl radicals which subsequently forged into C-C, C-X (X = S, Se) bond forming reactions. The reaction is quite general and efficient for the generation of both primary and secondary radicals when trapped with allyl sulfone, furnished allylated products in moderate to good yields. Moreover, resultant radicals can further engage into sulfurization and selenylation products. The efficiency of CdSe is further demonstrated by recycling the QD by precipitation and filtration and used as such for next reaction which afforded the products with marginal loss.



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