Structural Optimization of Synthetic Anthocyanin-based Dyes Towards Bio-inspired Dye-Sensitized Solar Cells

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The use of natural/bio-inspired pigments as sensitizers in Dye-Sensitized Solar Cells (DSSCs) has come to be a worthwhile substitute to the inorganic/organic sensitizers due to the cost-effective enhancement and reduced environmental pollution risks.[1] The first reported DSSC using a natural anthocyanin displayed a conversion yield of 0.56% and paved the way for sustainable DSSCs based on renewable resources.[2] However, despite conferring to Nature a variety of colors, these naturally selected structures are often not optimized for efficient electron transfer for DSSC application. In this work, several bio-inspired pyranoanthocyanin and anthocyanin derivatives were designed, synthesized and applied as dye sensitizers in DSSCs (Figure 1). The current *vs*. potential properties of photoanodes using these dyes pointed to the relationship between power conversion efficiency and dye structure. These included the influence of the donor group, π-conjugation, and the type of anchoring unit on the adsorption of the dyes to TiO_2 and on the overall performance of the DSSCs.[3,4] Overall, non-optimized efficiencies up to 2.6% were achieved, which substantiates the importance of this family as potential dye-sensitizers for practical DSSC applications.

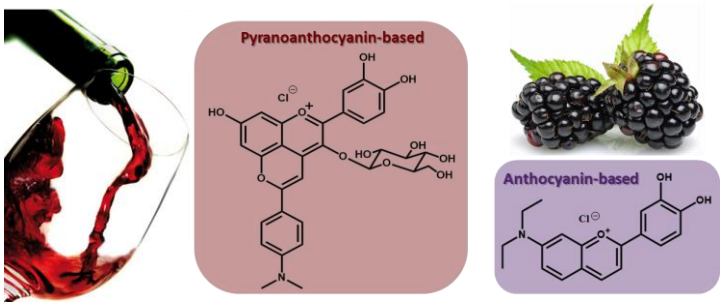

Figure 1. *Pyranoanthocyanin and anthocyanin-inspired structures optimized for DSSC application.*

References

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