Development of New Organic Compounds for Dye-Sensitized Photocatalytic and Photoelectrochemical Hydrogen Production

Xheila Yzeiri,[a,b] Alessandra Pace,[a,b] Elena Ermini,[a] Ylenia Nowak,[a] Daniele Franchi,[a] Alessio Dessì,[a] Massimo Calamante,[a,c] Gianna Reginato,[a] Alessandro Mordini,[a,c] Lorenzo Zani[a]

[a] *Institute of Chemistry of Organometallic Compounds (CNR-ICCOM), Via Madonna del Piano 10, I-50019 Sesto Fiorentino, Italy;* [b] *Department of Biotechnology, Chemistry and Pharmacy, University of Siena, Via A. Moro 2, I-53100 Siena, Italy;* [c] *Department of Chemistry "U. Schiff", University of Florence, Via della Lastruccia 13, I-50019 Sesto Fiorentino, Italy.*

In the context of the ongoing transition to renewable energy sources, research on the efficient conversion of sunlight into electricity or chemical energy (in the form of so-called "solar fuels") has become a topic of exceptional scientific and technological relevance. The development of new organic compounds plays a pivotal role in this area, due to their wide employment as functional materials in several solar conversion technologies. Over the years, our group explored the design and synthesis of many such compounds, demonstrating their application both in new generation photovoltaic cells and innovative sunlight concentration devices.[1-3] Besides that, we also investigated the application of numerous organic photosensitizers in dye-sensitized photocatalytic systems for H_2 production (Figure 1a), using various organic species as electron donors.[4-7] More recently, we extended these studies to the synthesis of organic dyes for application in dye-sensitized photoelectrochemical cells (DS-PEC) in combination with suitable water oxidation catalysts, aiming to produce hydrogen through water splitting (Figure 1b). In this communication, we will present the main results of such investigations, highlighting the influence of the sensitizers' structure and spectro-electrochemical properties on device performances.

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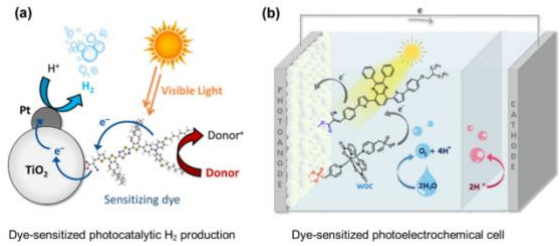

Figure 1. *(a) Dye-sensitized photocatalyst and (b) DS-PEC for visible light-mediated hydrogen production*

References

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