H_2 photogeneration at droplet placed on recessed electrode

Ariba Aziz[1], Wojciech Nogala[1], Marcin Opallo[1†]

[1]Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44/52, 01-224, Warszawa, Poland
† corresponding author's email: mopallo@ichf.edu.pl

Light-driven HER at liquid|liquid (LL) interface with metallocene as electron donor is a strategy to reduce protons without additional photosensitizer [1,2]. Here, we will demonstrate a system allowing the decrease of the volume of the organic phase and continuous electrochemical recycling of the electron donor. For this purpose, a droplet of decamethylruthenocene (DMRc) solution in trifluorotoluene (TFT) was placed on a recessed Pt microelectrode in contact with aqueous acid. LL interface was chemically polarized by dissolving different salt of highly hydrophobic tetrakis(pentafluorophenyl) borate anion (TB^-) in both phases to ensure proton transfer from aqueous to organic phase [3]. This system differs from that earlier proposed, because it does not require precise positioning of the microelectrode below LL interface [4] and cancerogenic 1,2-dichloroethane was replaced by TFT [5].

SECM was employed for the detection of generated hydrogen. Substrate generation/tip collection mode was applied in an Ar saturated acidic solution, whereas feedback mode was used in H_2 saturated neutral electrolyte. In both conditions, hydrogen was detected above an organic droplet in the presence of light.

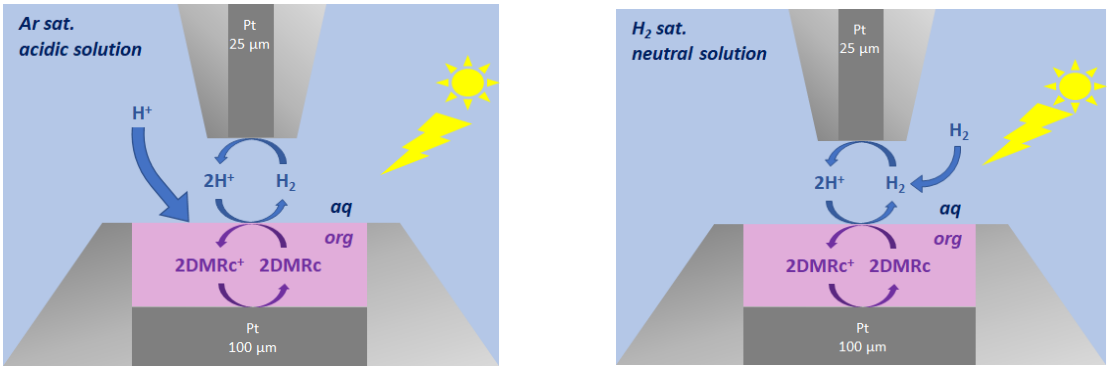

Figure 1: Schemes of detection of H_2 photogenerated at liquid|liquid interface with electrochemical recycling of electron donor.

Acknowledgments

Financial support by the National Science Centre (NCN, Poland) through grant UNISONO Solar-Driven Chemistry (DFG) No. 2019/01/Y/ST4/00022.

References

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