Photocatalytic or sonochemical hydrogen formation using the conjugated polymer PTEB?

Muhammad Zeeshan,[1] Jacob Schneidewind[1]

[1] Center for Energy and Environmental Chemistry, Friedrich Schiller University Jena, 07743 Jena, Germany,

E-Mail presenting author: muhammad.zeeshan@uni-jena.de

A promising method for generating clean, green hydrogen from water is through photocatalytic water splitting, which could help to meet the demand for sustainable energy sources worldwide. A particularly interesting class of photocatalyst materials are conjugated polymers, which could combine tunability, cost-effectiveness and scalability. Wang *et al.* have reported that polytriethynylbenzene (PTEB) shows activity for light-driven overall water splitting.[1,2] To deepen our understanding of this photocatalyst material, we have investigated its synthesis, structure and photocatalytic properties through the use of *in situ* oxygen and *ex situ* hydrogen detection. Through these investigations we have found that sonochemical treatment, which is also part of the original photocatalytic protocol, leads to hydrogen formation even under dark conditions This raises the question to which extent light driven processes are actually responsible for the observed activity. This work therefore provides new insights into water splitting using PTEB and different factors that can affect heterogeneous water splitting studies.

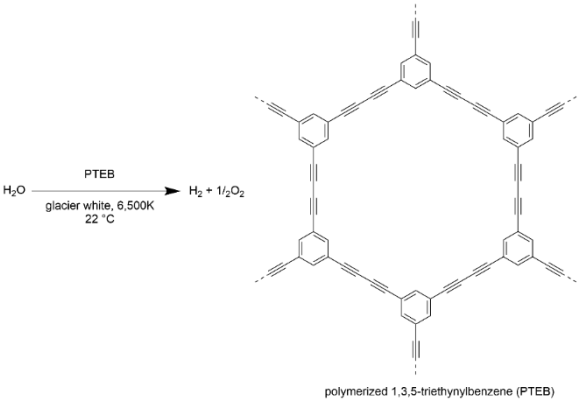

Figure 1: Photocatalytic water splitting via PTEB

[1] L. Wang, *et al.*, Adv. Mater. 2017, *29*, 38, 1702428, 10.1002/adma.201702428
[2] L. Wang, *et al.*, ChemCatChem, 2019, *11*, 24, 6236-6243, 10.1002/cctc.201901500.