Microreactors and 3D-printed structures to produce hydrogen with photocatalysts and concentrated solar power.

The demand for clean and renewable energy is increasing because of rapid depletion of fossil fuels and stringent environmental and political constraints. In this context, hydrogen is emerging as a natural choice because it is a clean energy carrier and represents the final objective of a decarbonized society. The water splitting reaction can be intensified by using suitable photocatalytic microreactors that allow an efficient use of the photons through an effective contact between the photocatalyst and the reactants and an optimal exposure to the light. On the other hand, the photocatalyzed oxidation of biomass-derived products acting as sacrificial agents can smooth the path for producing hydrogen from renewable sources. In addition, the use of gas-solid reactions, which play a major role in most of industrialized catalytic processes, can also help to implement a process intensification for photocatalytic hydrogen production. Here we will discuss about the performance of different types of microreactors loaded with photocatalysts as well as 3D-printed photocatalytic microstructures to obtain hydrogen from gaseous mixtures of ethanol-water under dynamic conditions, both under artificial UV-light LED source and direct solar radiation.