Review of: "A host–guest semibiological photosynthesis system coupling artificial and natural enzymes for solar alcohol splitting"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

The manuscript (Manuscript ID: s41467-021-25362-4) entitled “A host-guest semibiological photosynthesis system coupling artificial and natural enzymes for solar alcohol splitting” reported a coenzyme-mediated supramolecular host-guest semibiological system that combines artificial and enzymatic catalysis for photocatalytic hydrogen evolution from alcohol dehydrogenation. A redox-active metal-organic cage Co_3TPS_2 as a hydrogenase analog was embedded into the catalytic pocket of natural enzyme ADH through supramolecular interactions for solar alcohol splitting. Many interesting results are obtained in the manuscript, however, the manuscript need revision before acceptance for publication, some questions are listed below.

For example:
(1) In the reaction process, ethanol, generally considered to be a capture agent of photogenerated electrons, is added into the reaction system as a solvent, whether which will affect the yield of hydrogen?
(2) The author should verify the source of hydrogen (from reaction solvent water or aldehyde)?
(3) To demonstrate the wide applicability of the photocatalyst, the author should expand the reaction substrates (a range of alcohols).
(4) The photocatalytic performace of the as-obtained composite samples is poor under the irradiation of the 300 W Xe lamp.
(5) In the introduction section, some relevant references about the splitting of alcohols to form aldehyde and hydrogen should be cited.