Artificial Photosynthesis – Concluding Remarks

SUPPORTING INFORMATION

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1. Words deleted from the word cloud, considered of no scientific relevance

Fig, Ev, mA, RHE, Nm, Cm, Also, Due, Using, Table, Without, Similar, Observed, Prepared, However, Based, Formation, Presence, Shown, Compared, Higher, Addition, mL, nm, used, added, mol, within, mM, vs, II, Increase, First, Showed, Performed, Reported, Different, Possible, Min, High, Data, Respectively, Containing, One, Mol, Measurements, Experiments, Two, Results, Obtained, Sample, Shows, Method, Well, Study, Result, Applied, Use

2. Comparison with other technologies

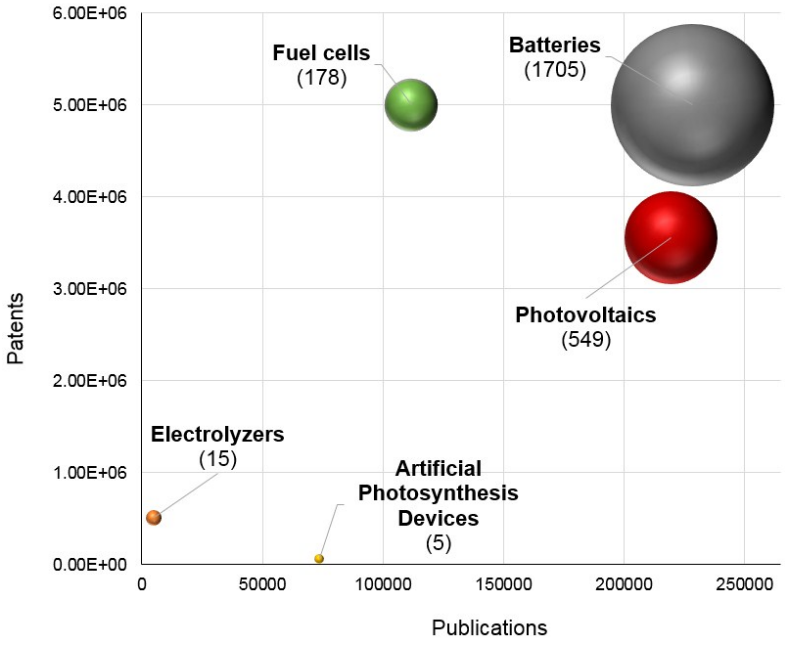

Figure S1. Comparison between battery, photovoltaic, fuel cell, electrolyzer and artificial photosynthesis technologies based on the number of patents (y-axis), publications (x-axis) and companies (bubble size in parenthesis). Search details are given below – we note that uncertainty on the most appropriate search terms for each technology means this figure has a higher degree of subjectivity than other search results reported in this manuscript.

Number of Patents (number of results obtained from the combination of search terms "…" or "…" etc.): patents.google.com
Number of companies (taken from the search with the maximum amount of results): crunchbase.com
Number of publications (number of results obtained from the search specified in part 3): www.webofknowledge.com

BATTERIES: "Battery" or "Batteries"
PHOTOVOLTAICS: "Photovoltaic" or "Photovoltaics" or "Solar cell" or "Solar cells"
FUEL CELLS: "Fuel cells" or "Fuel cell"
ELECTROLYZERS: "Electrolyzer" or "Electrolyzers" or "Electrolyser" or "Electrolysers"
ARTIFICIAL PHOTOSYNTHESIS: "Artificial Photosynthesis" or "Solar fuels" or "Solar fuel" (for patents and companies); terms defined in part 3 to have the number of publications.

3. Research Area classification

Complete list of Research Area categories at Web of Science (last consulted on May 2019): https://images.webofknowledge.com/images/help/WOS/hp_subject_category_terms_tasca.html

Definition of each category (last consulted on May 2019): http://mjl.clarivate.com/scope/scope_scie/

4. Advanced search in Web of Science

TS searches in the title, abstract and keywords
" " searches for the exact expression
** searches for any possible prefix or suffix*
OR searches papers containing either of the search concepts
NOT searches papers not containing the search concepts
AND searches papers containing all the search concepts

ARTIFICIAL PHOTOSYNTHESIS (1):

TS=("solar fuel*") OR TS=("artificial photosynthesis") OR TS=("photo* reduction") OR TS=("photo* oxidation") OR TS=("electrochemical photolysis") OR TS=(photo* AND "water splitting") OR TS=(photo* AND "water-splitting") OR TS=(photo* AND "CO2 reduction") OR TS=(photo* AND "carbon dioxide reduction") OR TS=(photo* AND "water oxidation") OR TS=(photo* AND "oxygen evolution") OR TS=(photo* AND "oxygen production") OR TS=(photo* AND "O2 evolution") OR TS=(photo* AND "O2 production") OR TS=(photo* AND "water reduction") OR TS=(photo* AND "proton reduction") OR TS=(photo* AND "hydrogen evolution") OR TS=(photo* AND "H2 evolution") OR TS=(photo* AND "hydrogen production") OR TS=(photo* AND "H2 production") OR TS=(electrochemical AND "water splitting") OR TS=(electrochemical AND "water-splitting") OR TS=(electrochemical AND "CO2 reduction") OR TS=(electrochemical AND "carbon dioxide reduction") OR TS=(electrochemical AND "water oxidation") OR TS=(electrochemical AND "oxygen evolution") OR TS=(electrochemical AND "oxygen production") OR TS=(electrochemical AND "O2 evolution") OR TS=(electrochemical AND "O2 production") OR TS=(electrochemical AND "water reduction") OR TS=(electrochemical AND "proton reduction") OR TS=(electrochemical AND "hydrogen evolution") OR TS=(electrochemical AND "H2 evolution") OR TS=(electrochemical AND "hydrogen production") OR TS=(electrochemical AND "H2 production")

Searches that have been done within the Artificial Photosynthesis results:

MOLECULAR CATALYSTS combined with (1): TS=("molecular catalyst*") OR TS=("organometallic complex*") OR TS=("organometallic molecule*")

PLATINUM GROUP METALS combined with (1): TS=(PGM) OR TS=("Platinum Group Metal*") OR TS=(Platinum) OR TS=(Pt) OR TS=(Ruthenium) OR TS=(Ru) OR TS=(Iridium) OR TS=(Ir) OR TS=(Rhodium) OR TS=(Rh) OR TS=(Palladium) OR TS=(Pd) OR TS=(Osmium) OR TS=(Os) OR TS=("IrO2") OR TS=("RuO2")

The word "Ir" has been omitted from the search on platinum group metals to avoid filtering papers involving infrared light (IR).

METAL OXIDES combined with (1) and excluding papers on perovskites and platinum group metals: TS=("metal oxide*") OR TS=("oxide*") OR TS=("inorganic semiconductor*")

ENZYMES combined with (1): TS=(enzyme*) OR TS=(protein*)

CARBON NITRIDES combined with (1): TS=("carbon nitride*")

POLYMERS combined with (1) and excluding papers on carbon nitrides: TS=(polymer*)

PEROVSKITES combined with (1) and excluding papers on metal oxides and platinum group metals: TS=("perovskite*) OR TS=("PVK")

GALLIUM NITRIDES combined with (1): TS=("gallium nitride*) OR TS="(GaN")

DICHALCOGENIDES combined with (1): TS=("dichalcogenide*")

POLYOXOMETALATES combined with (1): TS=("polyoxometalate*") OR TS=("POM")

METAL- AND COVALENT- ORGANIC FRAMEWORKS combined with (1): TS=(*organic framework*) OR TS=("MOF") OR TS=("COF")

PHOTOCATALYTIC SUSPENSION combined with (1): TS=(homogeneous OR suspension*)

PHOTOELECTRODES combined with (1): TS=(photoelectrode*) OR TS=(photoanode*) OR TS=(photocathode*)

CATALYST combined with (1): TS=(*catalyst*)

CO2 REDUCTION combined with (1): TS=("CO2 reduction") OR TS=("carbon dioxide reduction")

WATER OXIDATION combined with (1): TS=("water oxidation") OR TS=("oxygen evolution") OR TS=("oxygen production") OR TS=("O2 evolution") OR TS=("O2 production")

WATER REDUCTION combined with (1): TS=("water reduction") OR TS=("proton reduction") OR TS=("hydrogen evolution") OR TS=("H2 evolution") OR TS=("hydrogen production") OR TS=("H2 production")