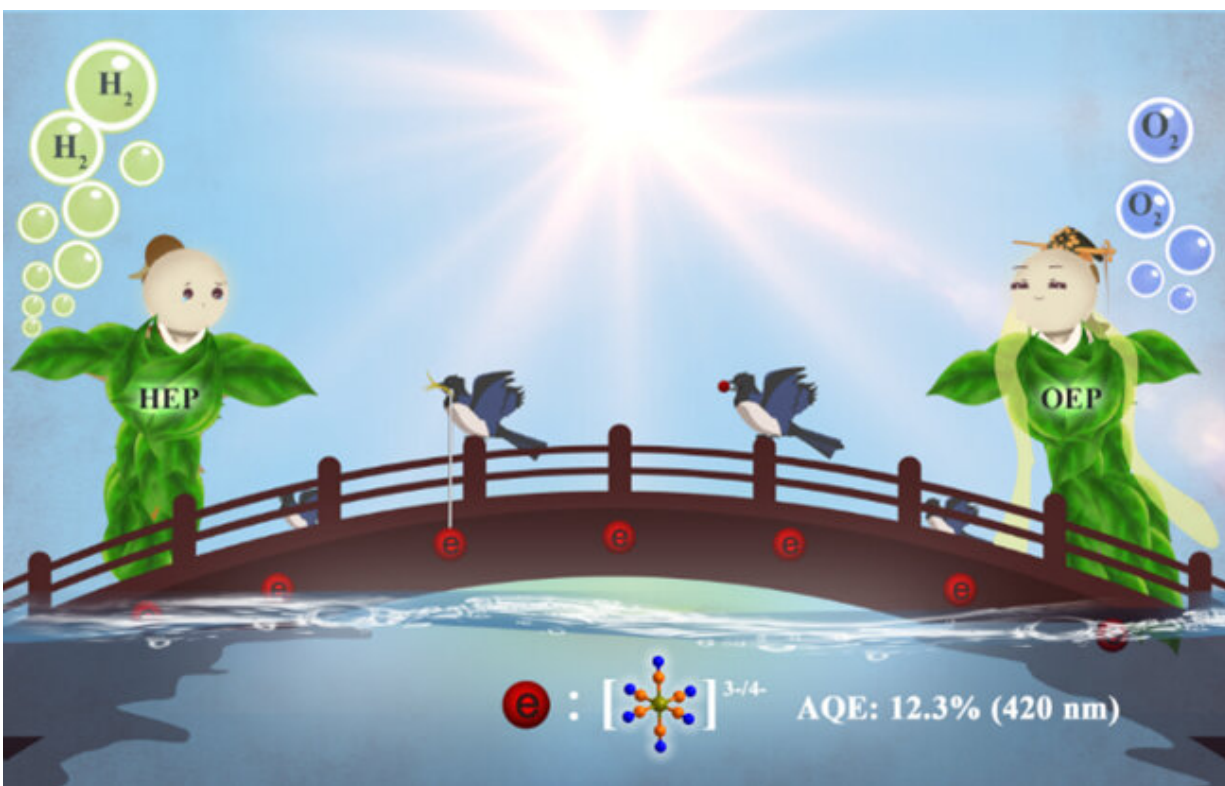


# Wide-visible-light-responsive photocatalyst boosts solar water splitting

January 31 2022, by Li Yuan



Unraveling of cocatalysts photodeposited selectively on facets of BiVO<sub>4</sub> to boost solar water splitting. Credit: Qi Yu

Photocatalytic overall water splitting (OWS) to produce hydrogen is one of the most promising technologies to solve energy and environmental problems and realize effective conversion and storage of solar energy.

However, due to the lack of efficient cocatalysts and limited understanding of the underlying mechanism, visible-light-driven photocatalytic OWS systems show relatively low efficiency with respect to the UV-light-responsive ones.

Recently, a research group led by Prof. Li Can, Prof. Zhang Fuxiang and Dr. Qi Yu from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS) has developed a highly efficient Z-scheme OWS system. The system enables benchmarked apparent quantum efficiency (AQE) and solar-to-hydrogen (STH) [energy](#) conversion efficiency over particulate inorganic semiconductor photocatalysts driven by visible light.

This study was published in *Nature Communications* on Jan. 25.

The researchers designed and developed Ir as reduction cocatalyst and FeCoO<sub>x</sub> composite as [water](#) oxidation cocatalyst, respectively.

Benefiting from the selective deposition of the above dual cocatalysts, photogenerated charge separation and water oxidation activity on BiVO<sub>4</sub> were achieved. The researchers assembled an efficient [visible-light](#)-driven photocatalytic OWS system with AQE of 12.3 percent (420 ± 10 nm excitation) through coupling with the hydrogen evolving photocatalyst.

In addition, they analyzed the microstructure of FeCoO<sub>x</sub> and its mechanism of promoting charge separation and water oxidation performance.

"These results may encourage and inspire the design and assembly of OWS systems for more efficient solar-to-chemical energy conversion," said Prof. Zhang.

**More information:** Yu Qi et al, Unraveling of cocatalysts photodeposited selectively on facets of BiVO<sub>4</sub> to boost solar water splitting, *Nature Communications* (2022). [DOI: 10.1038/s41467-022-28146-6](https://doi.org/10.1038/s41467-022-28146-6)

Provided by Chinese Academy of Sciences

Citation: Wide-visible-light-responsive photocatalyst boosts solar water splitting (2022, January 31) retrieved 26 June 2024 from <https://phys.org/news/2022-01-wide-visible-light-responsive-photocatalyst-boosts-solar.html>

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