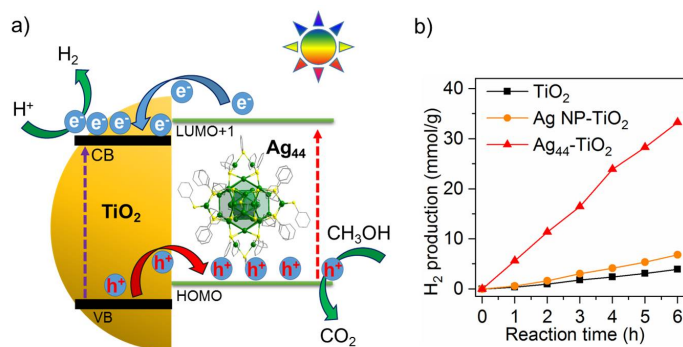


**Insights into charge transfer at the atomically precise nanocluster/semiconductor interface for in-depth understanding the role of nanocluster in photocatalytic system**



A TiO<sub>2</sub>/cluster composite of type II junction configuration for photocatalytic hydrogen evolution is built by deposition of atomically precise Ag<sub>44</sub> nanocluster on TiO<sub>2</sub>. Besides photosensitizer, the cluster is found to serve as co-catalyst to improve the charge separation efficiency of the system, which is quite different from the well-known plasmonic nanoparticle (NP) enhanced systems. The hydrogen production rate by Ag<sub>44</sub>-TiO<sub>2</sub> is ten times higher than that of the pure TiO<sub>2</sub> and five times higher than that of the Ag NP-TiO<sub>2</sub>.

(a) Schematic illustration of the H<sub>2</sub> production by Ag<sub>44</sub>-TiO<sub>2</sub> under simulated sunlight; (b) Catalytic performance of TiO<sub>2</sub> (black), Ag NP-TiO<sub>2</sub> (yellow) and Ag<sub>44</sub>-TiO<sub>2</sub> (red).

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