Photocatalytic Hydrogen Evolution in Covalent Organic Frameworks with Molecular Co-catalysts

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Owing to the easy tunability of electronics and structure, hence crystallinity and porosity, light induced hydrogen evolution with covalent organic frameworks (COFs) has garnered significant recent attention.[1,2,3] However, photocatalytic hydrogen evolution with COFs has till date only been explored with rare and expensive platinum co-catalyst. [1,2,3] We will present here, for the first time, light induced proton reduction catalysis with COFs using physisorbed cobaloximes as noble metal free molecular co-catalysts. Efficient hydrogen evolution (1155 μmol g^{-1} after 6 hours) is seen with an azine linked N2-COF and a chloro(pyridine)cobaloxime co-catalyst in the presence of triethanolamine as a sacrificial electron donor in water and acetonitrile mixture at pH 8 under AM 1.5 illumination. The results lead way to the development of efficient noble metal free COF-molecular-co-catalyst based photocatalytic systems with a precise control over the nature, density and arrangement of the photocatalytically active sites.

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