Photoelectrochemical Oxygen and Hydrogen Evolution with Various Electron Transfer Mediators

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WO_3 and Fe_2O_3 are well-known Photocatalysts for hydrogen and oxygen evolution under visible light irradiation. Generally the ability of Ag^+ for electron acceptor is well known but its reaction is irreversible because the Ag^+ get one electron from conduction band of WO_3 and precipitated as a form of Ag metal. On the other hand, Fe^{3+} and IO_3^- make redox with Fe^{2+} and I^- comparatively. Although Photocatalytic activity of WO_3 in oxygen evolution experiments with the solution of Ag^+ was best and next was Fe^{3+} solution, the reoxidations of Ag metal and Fe^{2+} which are reduced by the electron of conduction band of WO_3 did not occur in hydrogen evolution experiment with hydrogen producing photocatalysts. The redox iodide/iodate was worked between WO_3 as oxygen producing photocatalysts and $AgGaS_2$ as hydrogen producing photocatalyst.