

Development of BiVO₄ metal oxide as photoelectrochemical solar energy harvesting photoanode

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As promising candidate for energy production technology, PEC (photoelectrochemical) cell using photocatalyst has been intensively studied as promising alternative technology to produce solar fuel energy from fossil fuel energy. BiVO₄ (Clinobisvanite) is metal oxide semiconductor that its photocatalytic activity was discovered by Kudo et al as water oxidation photocatalyst. But yet material itself suffers a lot of short comings – slow water oxidation kinetics, low charge separation efficiency (by low conductivity of BiVO₄) and difficulty of synthesis. Herein, we present development we have been conducting regarding BiVO₄ as light harvesting material for solar energy to fuel conversion. Essential, representative technologies for improving material have been developed – electrocatalyzation, doping and heterojunction will be addressed. Based on such improvements, results such as overall water splitting device and CO₂ reduction to CH₄ via PEC cell will be also introduced as successful example of application.