Hydrogen production using plasmon enhanced photocatalysis in a microreactor

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**Abstract**

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Hydrogen gas is a suitable and an alternative candidate to conventional carbon-based fuels which produce harmful emissions. Metal hydrides are able to generate hydrogen gas efficiently. When dissolved in water, metal hydrides undergo hydrolysis and produce hydrogen gas without emitting harmful gases to environment. However, the H2 production rate from hydrolysis of metal hydrides is extremely slow. The reaction rate can be enhanced using photocatalysis. Transition metals are popularly known for this purpose due to their variable oxidation states and high reactivity. Because of specific property (plasmon heating) of platinum nanoparticles, they can be used as a photocatalyst. These nanoparticles also have an added advantage of offering larger surface area because of the size and structure. Different reactors have been employed for the production of hydrogen from photocatalysis. Due to specific advantages like low reaction temperature, microreactor is used for the production of hydrogen. Hydrogen production rate using plasmonic photocatalysis is compared with normal photocatalysis. Higher hydrogen production rate is observed for plasmonic photocatalysis when compared with photocatalysis without employing plasmonic particles.

**Keywords:** Plasmonic nanoparticles, microreactor, photocatalysis, plasmon heating