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The Effect of Directed Photogenerated carrier Separation on Photocatalytic Hydrogen Production

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Abstract:

The one-dimensional metal-semiconductor hybrids with directed photogenerated carrier separation rather than random flow direction of photogenerated electrons and holes possess more advantages to achieve long-distance charge separation and efficient solar energy conversion efficiency. Here, we obtained the non-centrosymmetric Au/TiO₂ nano-mushrooms (Au/TiO₂ NMs) structures. The one-dimensional hybrid simultaneously maintains directed spatial charge separation properties and tunable light absorption. Owing to the well-designed structure, the H₂ evolution rate can reach up to 52.6 μmol·g⁻¹·h⁻¹ under sunlight irradiation from pure water without any sacrificial reagents. Based on the photocatalytic data, we can speculated that the directed spatial charge separation lead to the enhanced photocatalytic efficiency rather than the localized surface plasmon resonance (LSPR)

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