

## Platinum doped MWNT/TiO<sub>2</sub> composite as an efficient UV -visible driven catalyst for hydrogen production

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In this report, platinum nanoparticles (Pt)-doped multi-walled carbon nanotube (MWNT)/titanium dioxide (TiO<sub>2</sub>) ternary composite was synthesized by a two-step approach. In the first step, the MWNT/TiO<sub>2</sub> composite was prepared via a sol-gel technique followed by post annealing. Finally, the Pt nanoparticles were doped by photo-reduction. This paper reports the enhanced hydrogen production through the application of Pt nanoparticles on photocatalytic water splitting under visible and UV-visible light. The results showed that no appreciable H<sub>2</sub> production was achieved using Pt@MWNT/TiO<sub>2</sub> ternary composites as a photocatalyst under visible light, whereas a substantial amount of H<sub>2</sub> was produced under full spectra. The ternary composite with a Pt loading of 1.5 wt% exhibited the highest H<sub>2</sub> production level (8718  $\mu\text{mol g}^{-1} \text{h}^{-1}$ ), which was significantly higher than that of pure TiO<sub>2</sub> (1571  $\mu\text{mol g}^{-1} \text{h}^{-1}$ ) and MWNT/TiO<sub>2</sub> composite (4713  $\mu\text{mol g}^{-1} \text{h}^{-1}$ ).