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# Anchoring Ultrafine Metallic and Oxidized Pt Nanoclusters on Yolk-Shell TiO<sub>2</sub> for Unprecedentedly High Photocatalytic Hydrogen Production

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**Abstract:** We demonstrate an alkali modification process to produce highly dispersed ultrafine Pt nanoclusters with metallic Pt<sup>0</sup> and oxidized Pt<sup>2+</sup> species as co-catalyst anchored on nanosheet-constructed yolk-shell TiO<sub>2</sub> (NYTiO<sub>2</sub>-Pt) acting as light harvesting reactor for highly efficient photocatalytic H<sub>2</sub> production. Benefiting from the high surface area, highly dispersed ultrafine Pt nanoclusters (~0.6 nm) with Pt<sup>0</sup> and Pt<sup>2+</sup> species and special nanosheet-constructed yolk-shell structure, this novel light harvesting reactor exhibits excellent performance for photocatalytic H<sub>2</sub> production. The NYTiO<sub>2</sub>-Pt-0.5 (0.188 wt% Pt)

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