Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information (ESI)

Enhanced, Robust Light-Driven H_2 Generation by Gallium Doped Titania Nanoparticles

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Electronic Supplementary Information (ESI) available: Detailed experiment of chopped photocurrent response measurement and Fig. S1-S4 include Rietveld refinement of Ga-doped TiO_2 samples, XRD patterns of Pt loaded Ga-doped TiO_2, time profiles of water splitting reaction, performance comparison with and without Pt co-catalyst, and transient photocurrent response of Pt loaded photocatalysts during light on/off cycles. See DOI: 10.1039/x0xx00000x

Photocurrent response measurement

The photocurrent response was monitored on a Basi Epsilon potentiostat using a three-electrode cell and a 150 W Xenon arc lamp (with aqueous $CuSO_4$ filter, 310 nm < λ < 625 nm) as the excitation source. The reference and counter electrodes were Ag/AgCl and Pt wire, respectively, while 0.1 M $HClO_4$ aqueous solution was used as the electrolyte. A PTFE-coated carbon paper (1.2 cm x 3 cm) coated with oxide material was employed as the working electrode (illuminated area of 0.785 cm^2). The working electrode was prepared by electrophoretic deposition using a Keithley 2410A electrometer at the Center for Functional Nanomaterials (BNL). The voltage (120 V) was automatically applied during 5 min depositing a suspension of powder and methanol. After drying at 80 °C, the electrode (circle geometry with 1 cm diameter) was finally annealed at 450 °C for 2 h prior to photoelectrochemical analysis. The on−off light-switching measurement was conducted at 1.25 V (*vs.* Ag/AgCl) by irradiating the front side of working electrode.

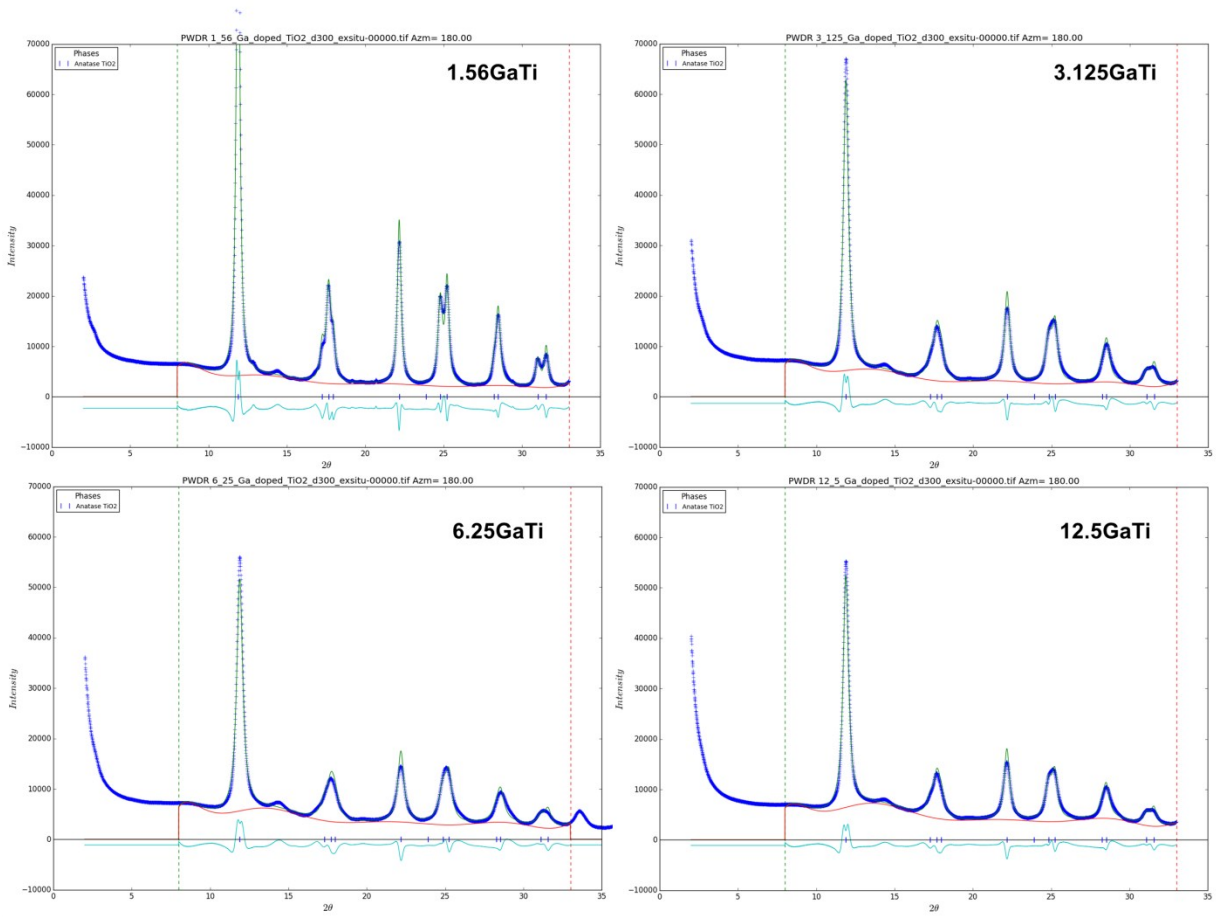

Fig. S1. Rietveld refinement of Ga-doped TiO_2 samples.

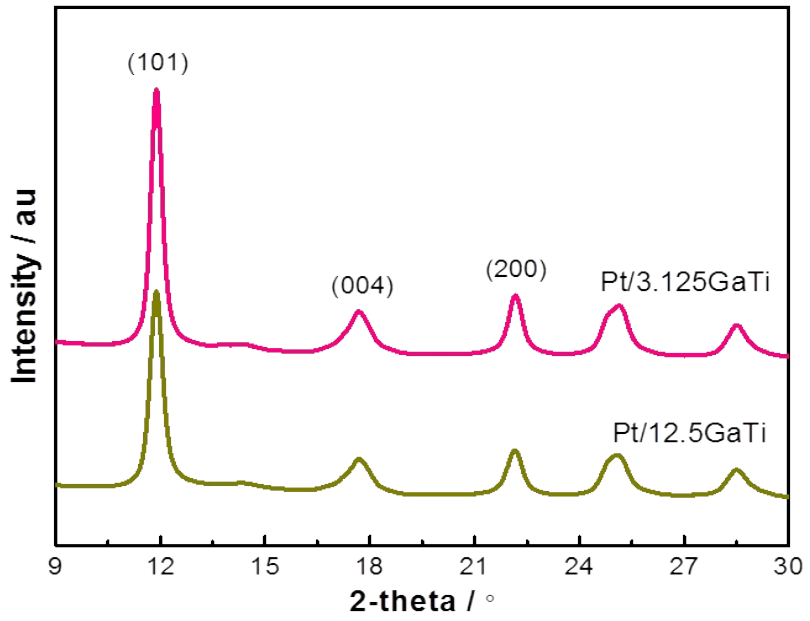

Fig. S2. XRD patterns of Pt/3.125GaTi and Pt/12.5GaTi samples.

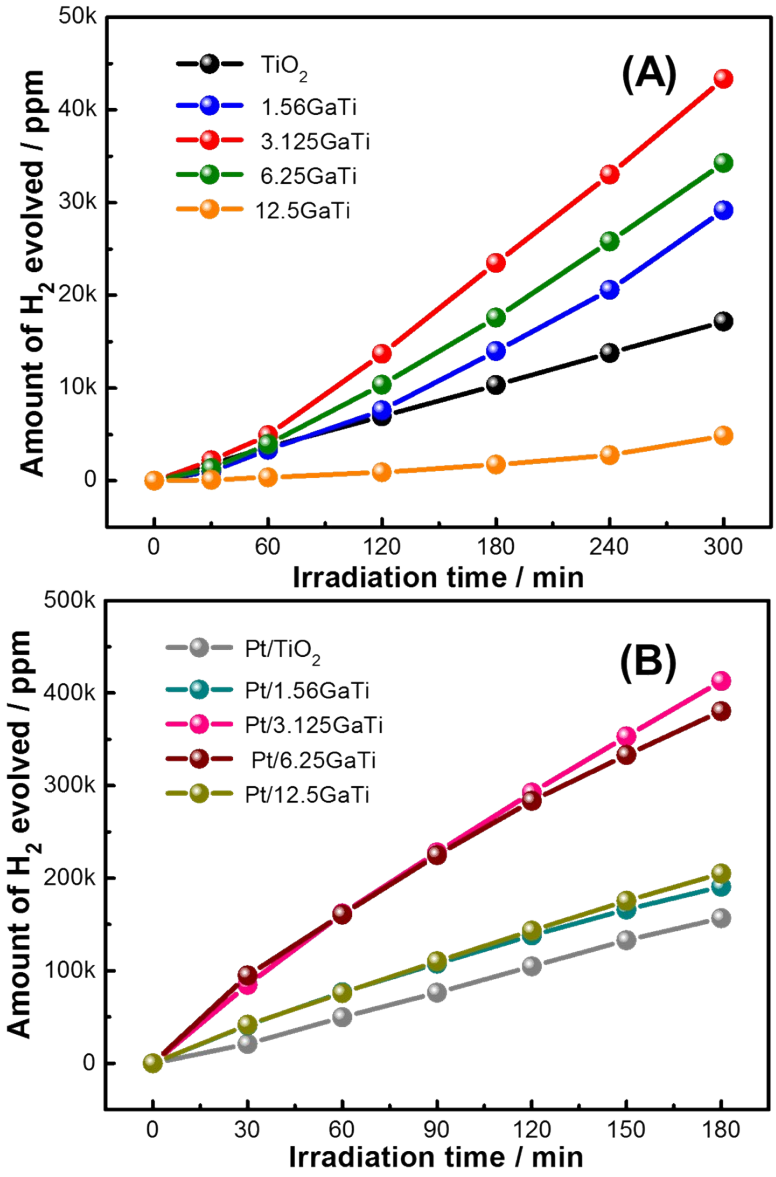

Fig. S3. Time profiles of H_2 evolution over undoped and Ga-doped TiO_2 (A) without and (B) with Pt cocatalyst under UV-Vis irradiation (λ = 310-625 nm).

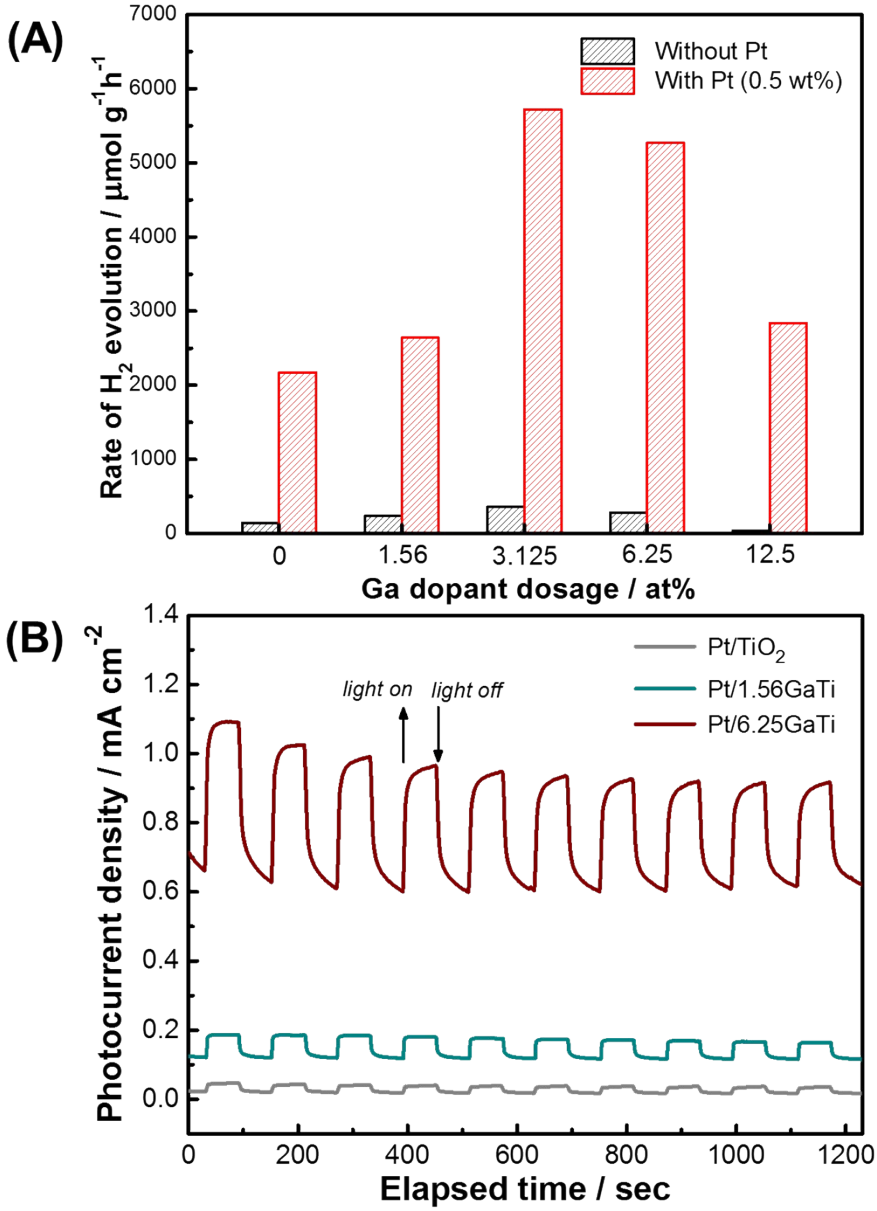

Fig. S4. (A) Comparison between cocatalyst-free and Pt-assisted H_2 evolution activity over undoped and Ga-doped TiO_2; (B) Transient photocurrent response of Pt/TiO_2 and Pt/Ga-doped TiO_2 during on/off cycles of 150 W Xe lamp illumination (λ = 310-625 nm).