Synthesis of Ce Ions Doped Metal-Organic Framework for Promoting Catalytic H_2 Production from Ammonia Borane under Visible Light Irradiation.

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Synthesis of TiO_2: In a typical synthesis, titanium tetrachloride aqueous solution (solution A) was prepared by dissolving 5.0 mL titanium tetrachloride in 15 mL of D. I. water which under the assisted of liquid nitrogen. 2 mL of ionic liquid 1-methyl-imidazolium tetrafluoroborate, 0.2 g of sodium dodecyl benzene sulfonate, 48 mL H_2O, and 2 mL of solution A were put into a Teflon-lined-walled digestion vessel. After that, The Teflon-lined-walled digestion vessel was sealed and treated at a controllable temperature of 150 ^oC for 90 min using a microwave digestion system (Ethos TC, Milestone), the vessel was then cooled down to room temperature. The samples are washed with deionized water and absolute ethanol, and dried in a vacuum at 80 ^oC for 4 h, followed by the thermal treatment at 600 ^oC for 2 h in air.

Synthesis of CdS: In a typical procedure, Cadmium nitrate, tetrahydrate (0.2272 mg), and Thiourea (0.151 mg) were added into the mixture solution containing 16 mL of ethylene glycol and 16 mL of water, followed by stirring for 15 min, and then the mixture was transferred to 50 mL Teflon-lined stainless steel autoclaves, and heated 12 h at 463 K. After the reaction, the products were extracted by centrifugation and washed with water and methanol, respectively. Finally, the products were dried under vacuum.

Preparation of Pd/TiO_2 and Pd/CdS: The as synthesized TiO_2 (0.2 g) was suspended in H_2O (20 mL) and sonicated for 20 min until it became highly dispersed. Then 0.7 mL (Pd: 0.25 wt%) of aqueous $PdCl_2$ solution (6.767 mM) was added and stirred at room temperature for 8 hours. After the reaction, the products were extracted by centrifugation and washed with water. Finally, the products were dried under vacuum and followed by 1 h H_2 reduction at 473 K for 1 h. The Pd/CdS was prepared under the same procedure.

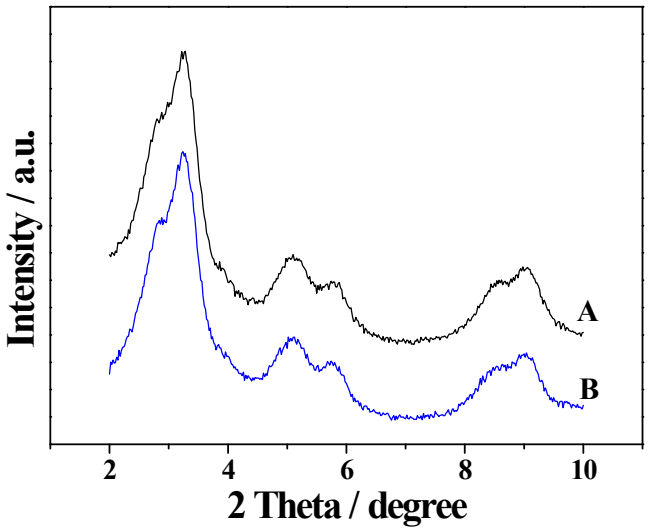

Figure S1. Low-angle XRD patterns of (A) MIL-101, and (B) CeMIL-101.

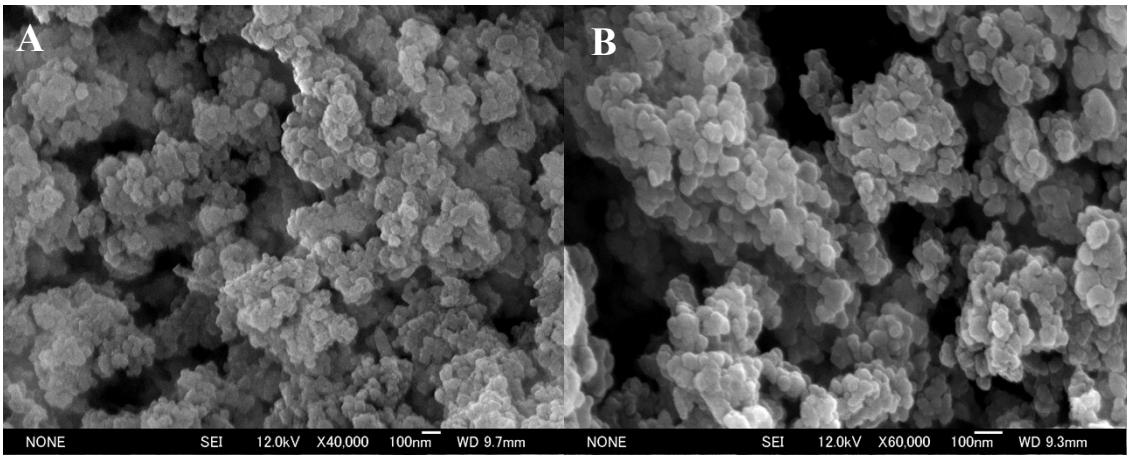

Figure S2. The TEM images of MIL-101 (a) and CeMIL-101 (b).

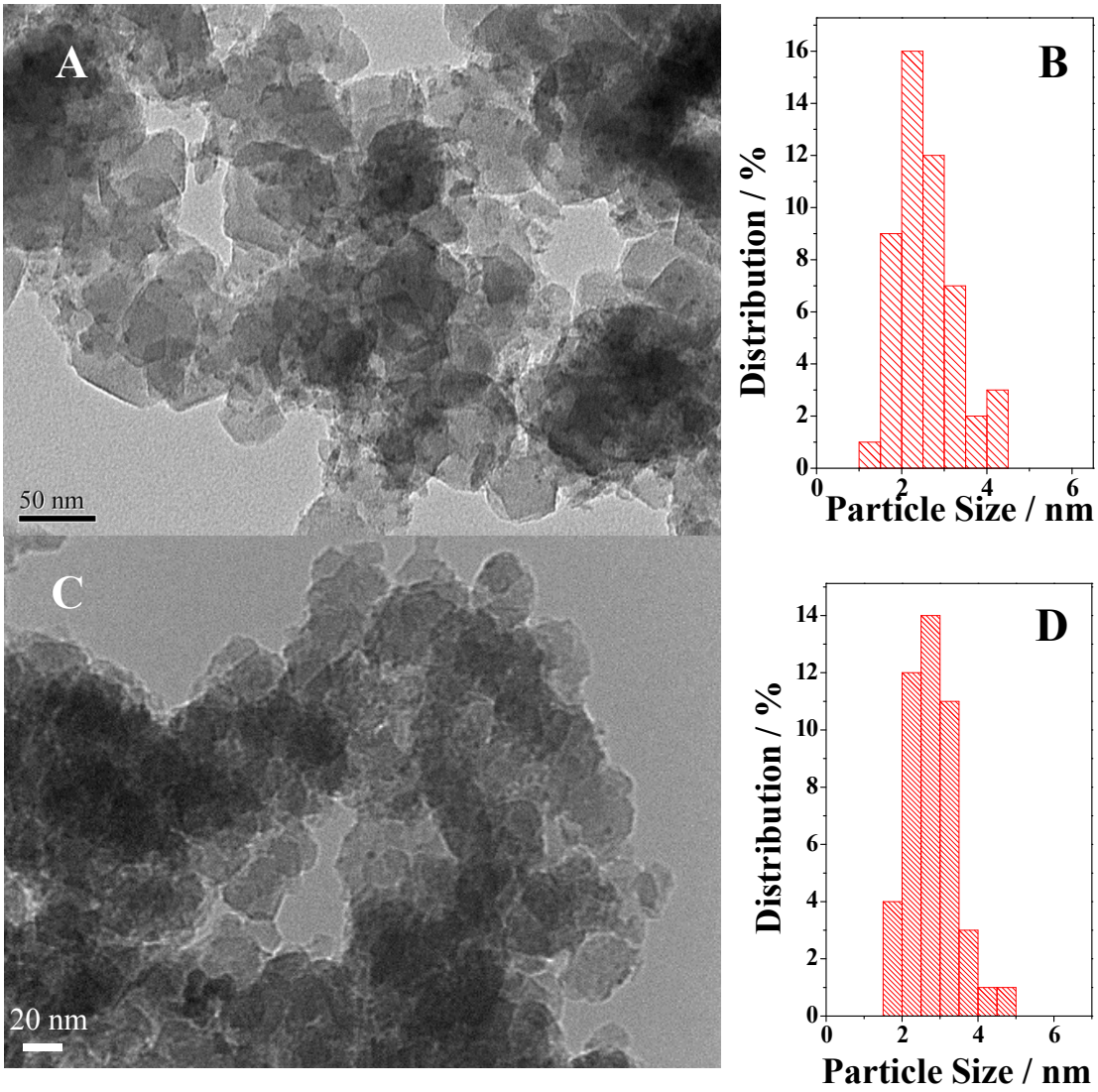

Figure S3. The TEM images of Pd/MIL-101 (A) and Pd/CeMIL-101(C); size distribution of Pd nanoparticles on Pd/MIL-101 (B) and Pd/CeMIL-101(D).

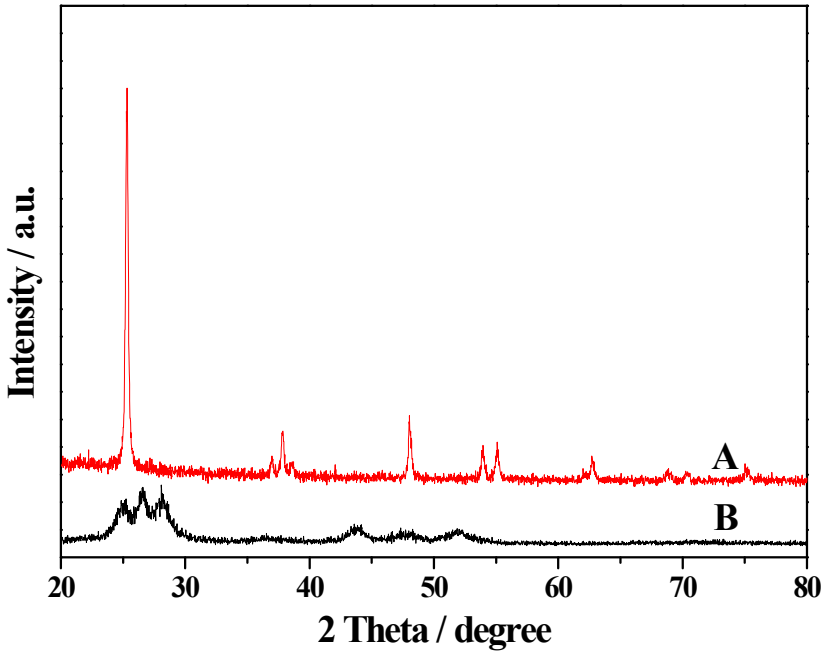

Figure S4. XRD patterns of TiO_2 (A) and CdS (B).

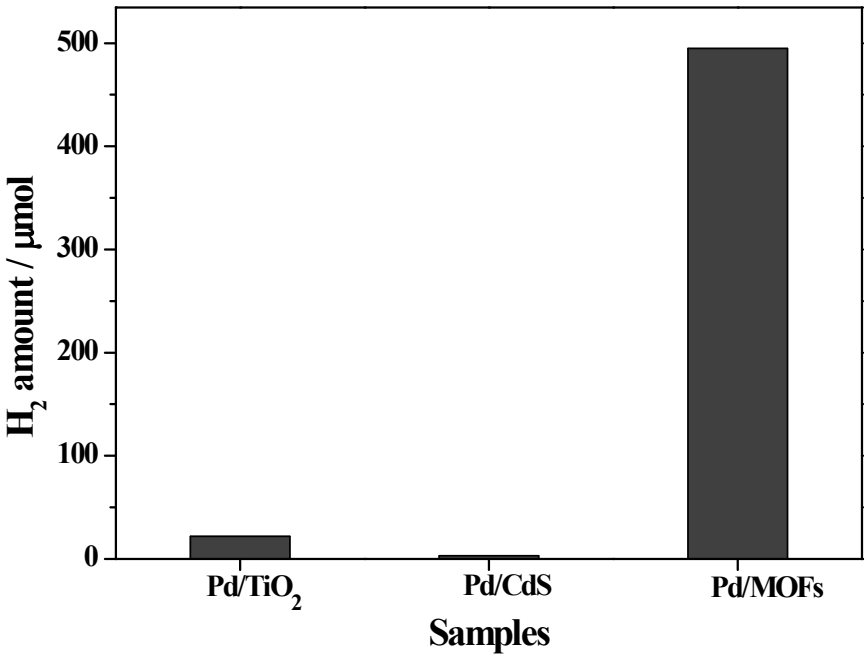

Figure S5. H_2 production from AB (0.2 mmol in 5 mL of H_2O) hydrolysis catalyzed by Pd/TiO_2, Pd/CdS, and Pd/CeMIL-101 at ambient temperature under visible light irradiation.

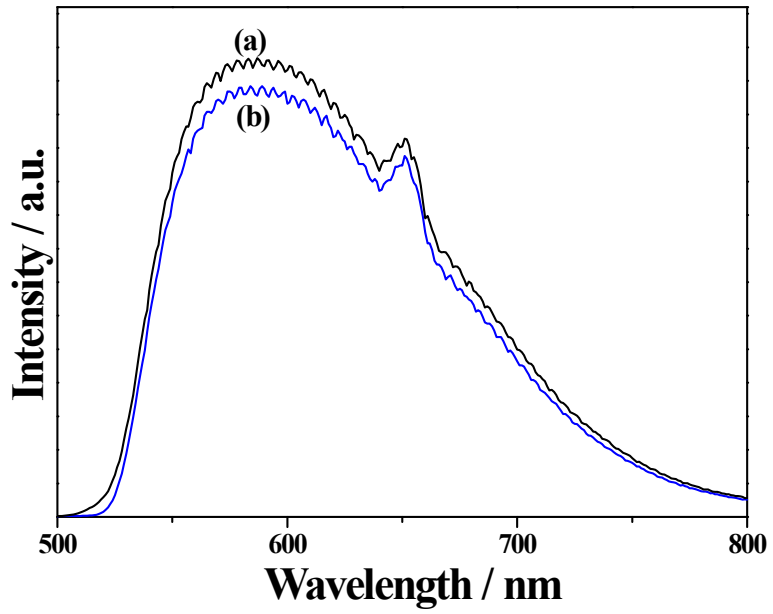

Figure S6, the comparison of photoluminescence spectra with an excitation wavelength of 325 nm between the solid Pd/MIL-101(a) and solid Pd/CeMIL-101(b).

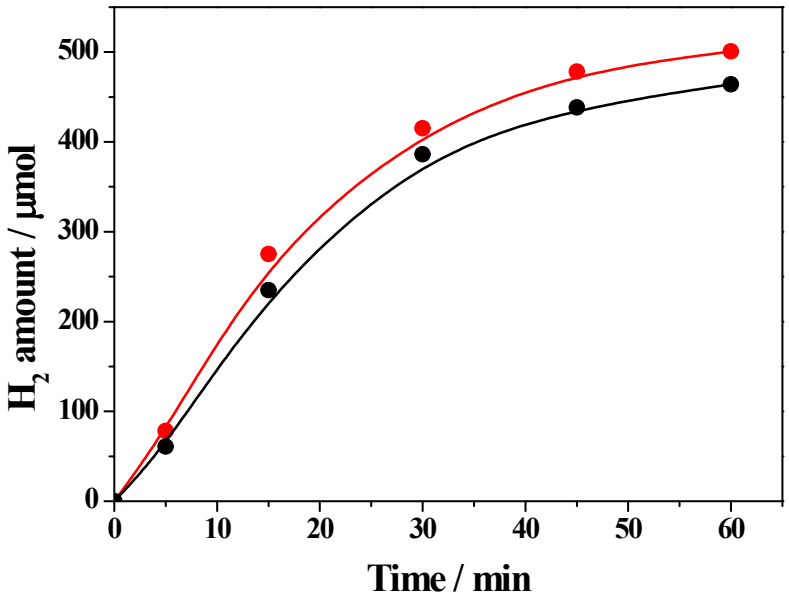

Figure S7 The photocatalytic performance of the Pd/CeMlL-101 for hydrogen production from AB hydrolysis with (black) and without (red) 1, 4-benzoquinone (0.1 mM) as superoxide anions scavenger under O_2 atmosphere.