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# Harvesting broadband absorption of solar spectrum for enhanced photocatalytic $H_2$ generation

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## SUPPORTING INFORMATION

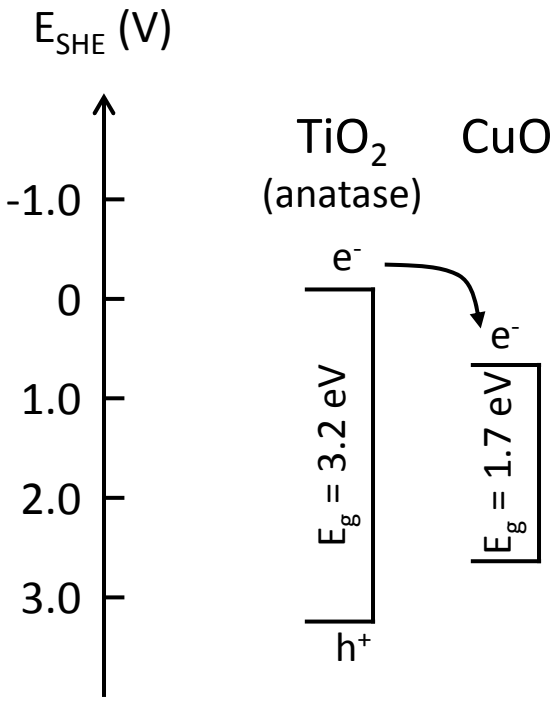


Figure S1 Schematic diagram showing the energy band positions of $TiO_2$, CuO with respect to standard hydrogen electrode (SHE) at pH 1, and transfer of electron from the conduction band of $TiO_2$ to CuO. The $E_{CB}$ of $TiO_2$ (anatase) is -0.25 V vs SHE[1], and the $E_{CB}$ of CuO is 0.96 V vs SHE[2].

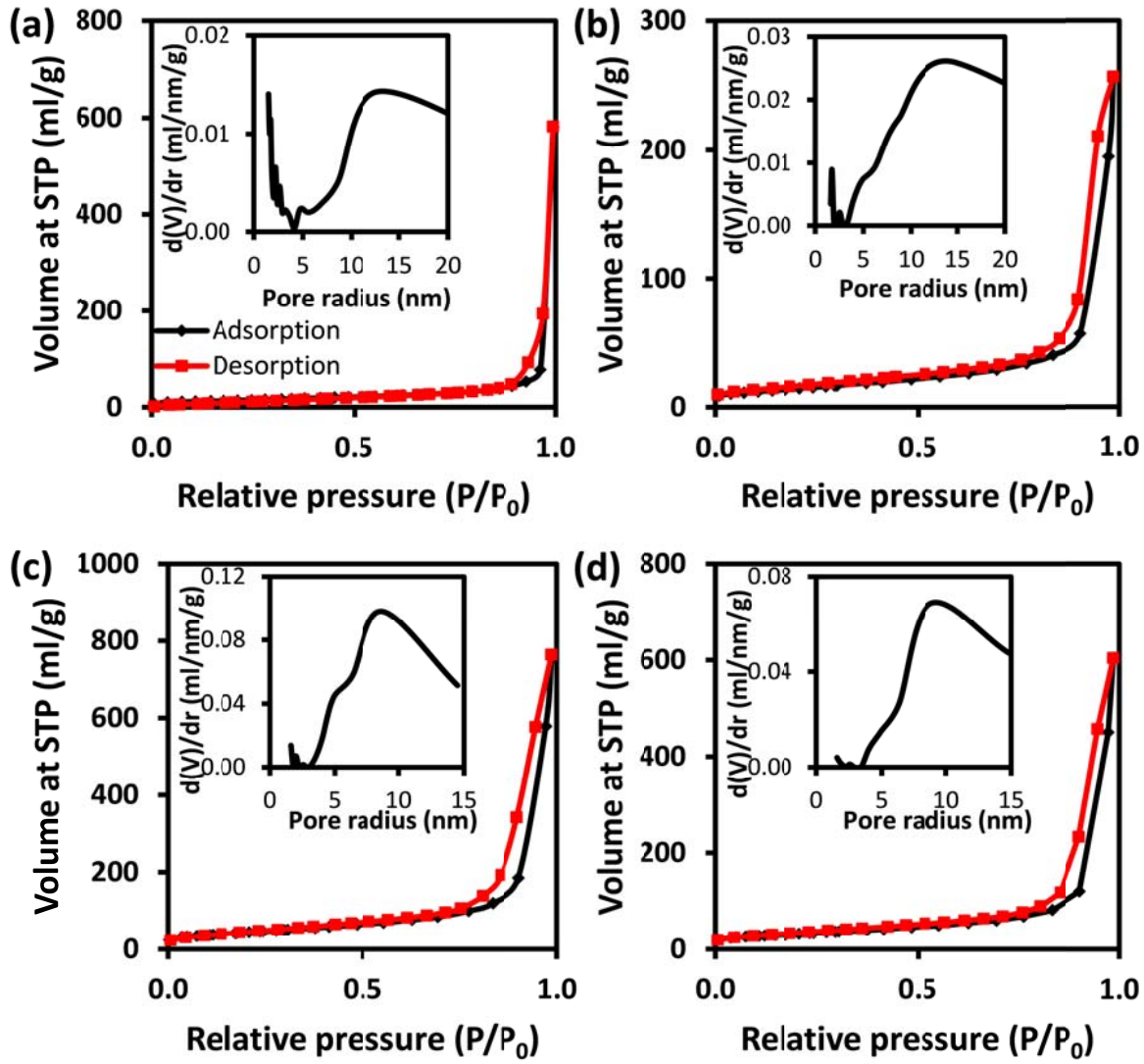


Figure S2 Nitrogen adsorption/desorption isotherms of (a) NP, (b) 3% CuO-NP, (c) NT and (d) 3% CuO-NT with (insets) corresponding BJH pore size distribution.

| Temperature (°C) | $H_2$ evolution rate (mmol/gh) | | | |
|---|---|---|---|---|
| | NP | 3%CuO-NP | NT | 3%CuO-NT |
| 25.0 | 0.0750 | 4.02 | 0.101 | 5.40 |
| 50.0 | 0.277 | 8.96 | 0.508 | 14.1 |
| 75.0 | 0.858 | 15.8 | 1.53 | 20.2 |
| 90.0 | 1.50 | 20.9 | 3.92 | 35.2 |

Table S1 $H_2$ evolution rate for different photocatalysts at different temperatures.

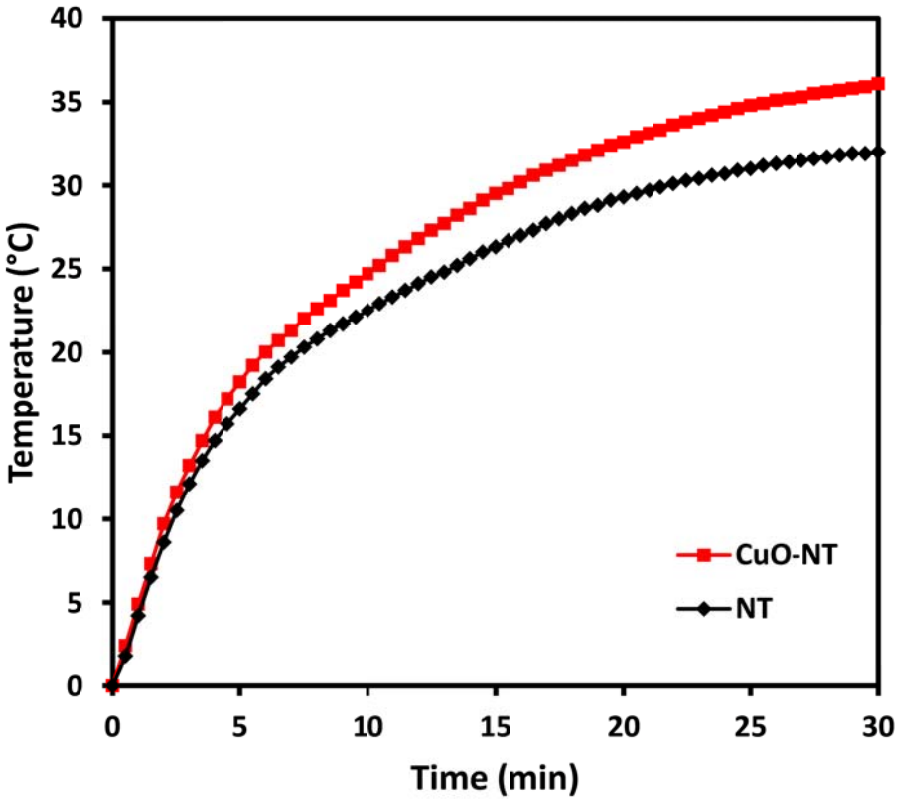


Figure S3 Temperature measurement of NT and CuO-NT in 20% vol glycerol solution under Xe Lamp illumination at 1000W/$m^2$.

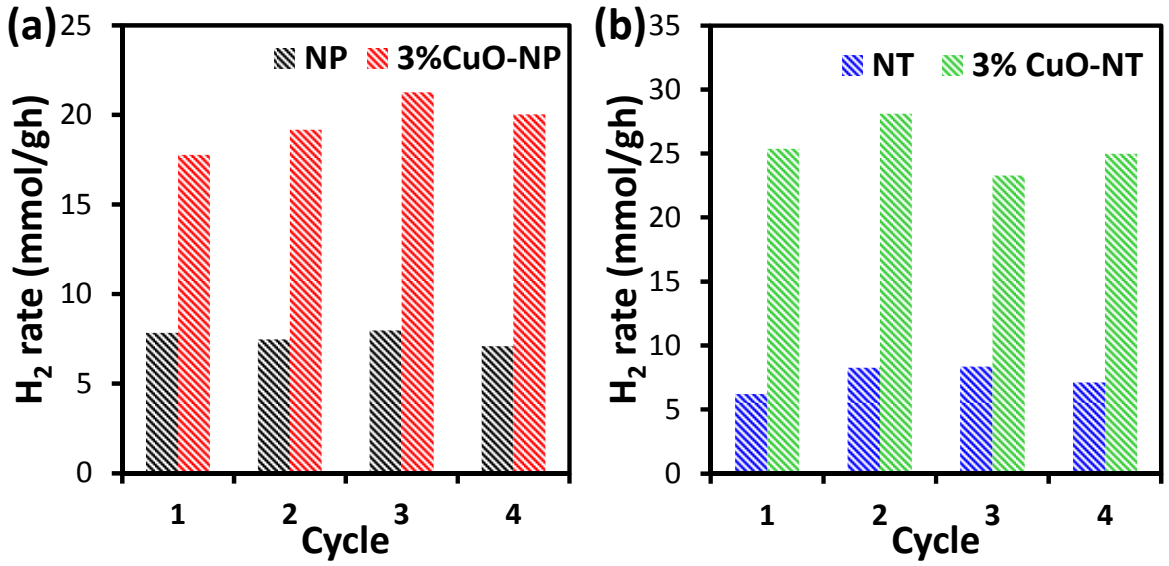


Figure S4 Initial rates of $H_2$ evolution for cyclic stability test of (a) NP and 3%CuO-NP; (b) NT and 3%CuO-NT at 90°C

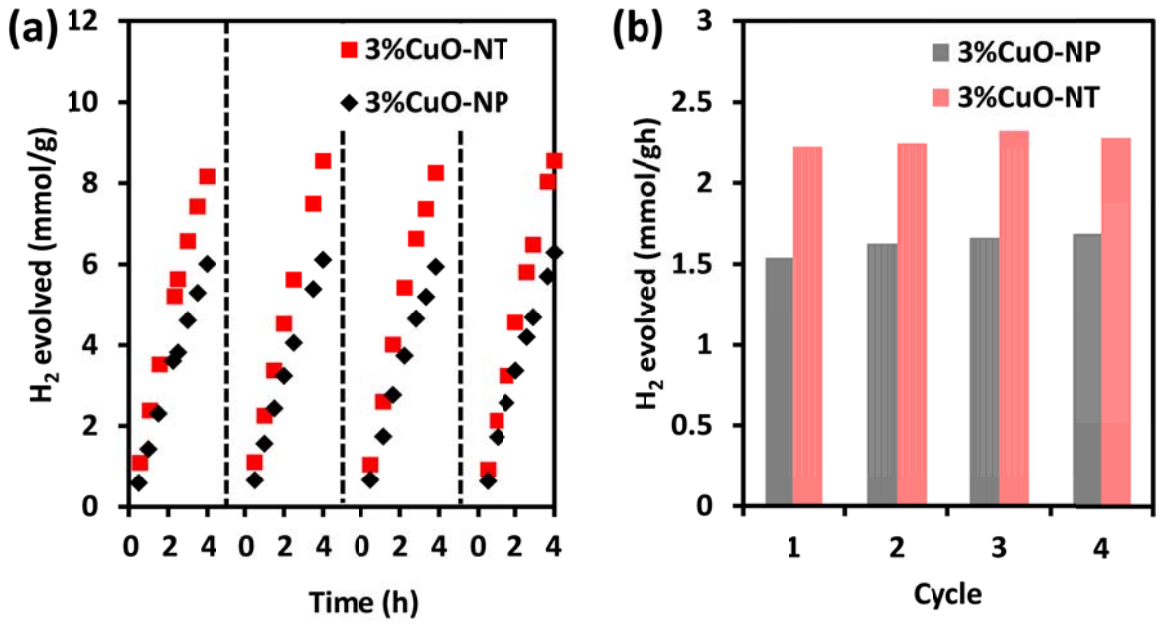


Figure S5 (a) Amount of $H_2$ evolved for cyclic stability test under Xe irradiation, measured for 4 cycles. (b) Initial rates of $H_2$ evolution for cyclic stability test of 3%CuO-NP and 3%CuO-NT

**References**


1. S. Burnside, J.-E. Moser, K. Brooks, M. Grätzel and D. Cahen, *J. Phys. Chem. B*, 1999, **103**, 9328-9332.

2. Y. Xu, M. A. A. Schoonen, *Am. Mineral.*, 2000, **85(3-4)**, 543–556.