Electronic Supplementary Information

Mesoporous Assembled Structures of Cu_2O and TiO_2 Nanoparticles for Highly Efficient Photocatalytic Hydrogen Generation from Water

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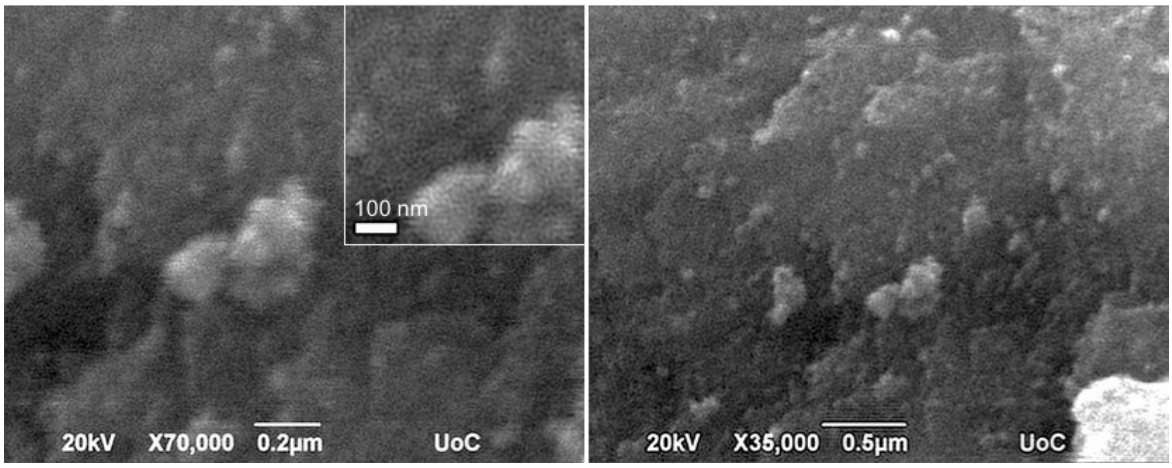

Fig. S1 Typical SEM images of mesoporous CuMTA-3 catalyst.

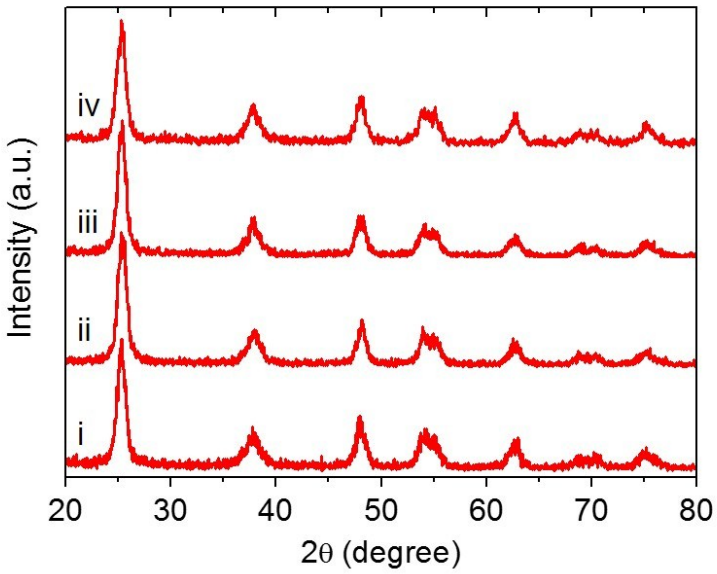

Fig. S2 Powder XRD patterns of mesoporous materials: (i) CuMTA-1, (ii) CuMTA-2, (iii) CuMTA-3 and (iv) CuMTA-4.

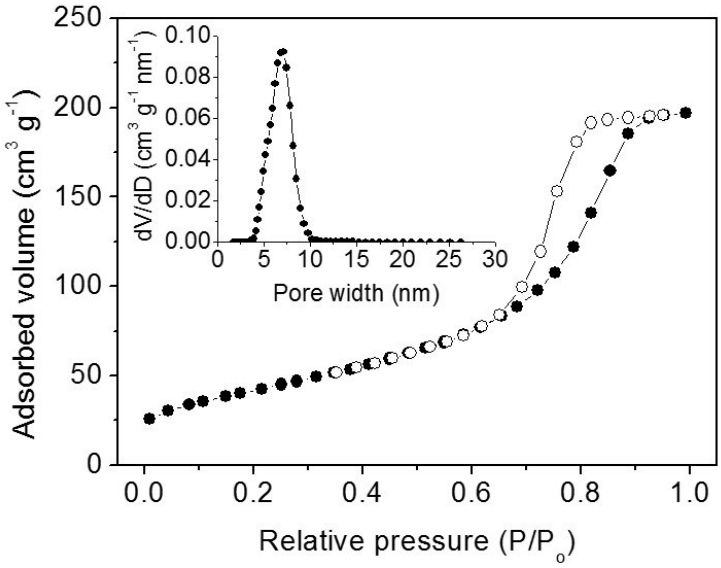

Fig. S3 Nitrogen adsorption–desorption isotherms at 77 K and the corresponding NLDFT pore-size distribution (inset) for mesoporous MTA material. Analysis of the absorption data indicates a BET surface area of 153 m^2g^{-1}, a total pore volume of 0.29 cm^3g^{-1} and a pore size of 7.1 nm.

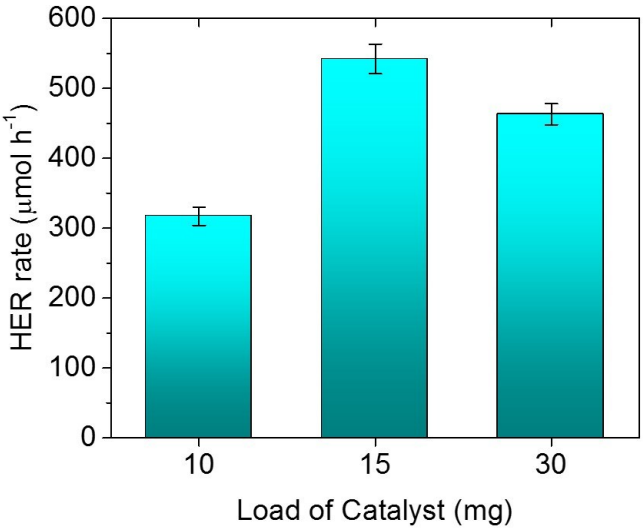

Fig. S4 CuMTA-3 catalyst loading dependence of the HER rate. The error bars indicate standard deviation.

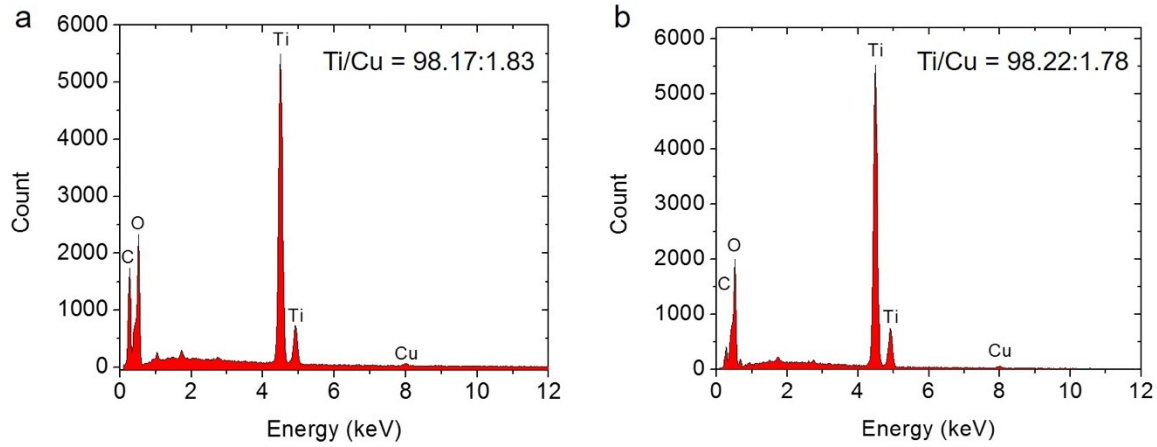

Fig. S5 EDS spectra of mesoporous CuMTA-3 composite (a) before and (b) after catalysis, indicating a Cu loading of 1.47 wt% and 1.42 wt%, respectively.

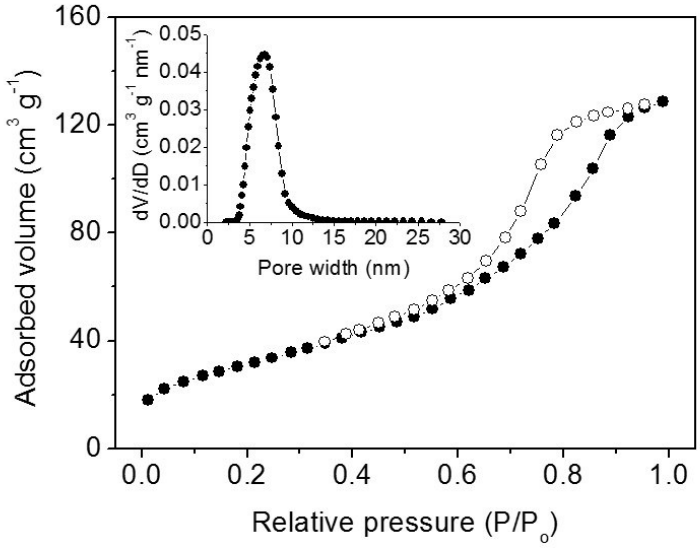

Fig. S6 Nitrogen adsorption–desorption isotherms at 77 K and the corresponding NLDFT pore-size distribution (inset) of the regenerated CuMTA-3 catalyst. Analysis of the absorption data shows a BET surface area of 121 m^2g^{-1}, a pore volume of 0.22 cm^3g^{-1} and a pore size of 6.8 nm.

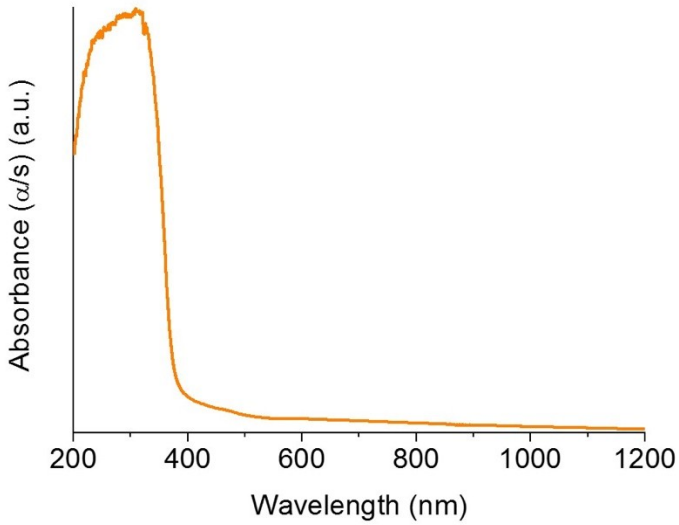

Fig. S7 UV–vis/NIR absorption spectrum, transformed from the diffuse reflection data according to the Kubelka-Munk method, of the regenerated CuMTA-3 catalyst.

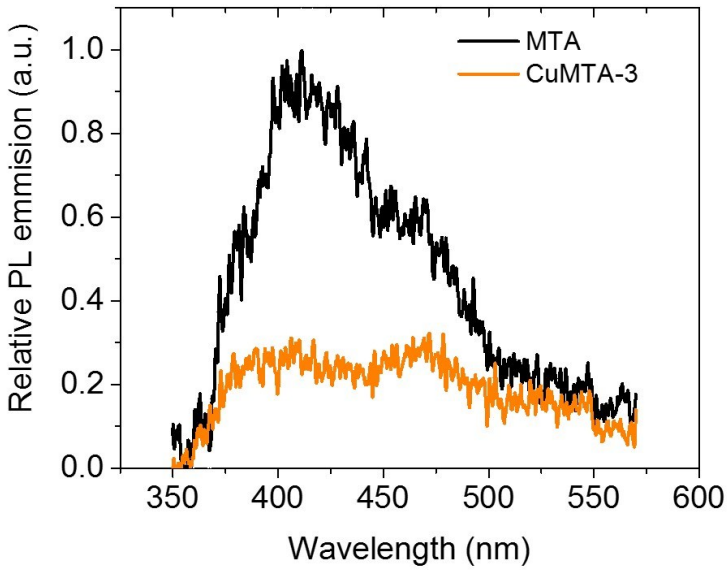

Fig. S8 Photoluminescence spectra of mesoporous TiO_2 (MTA) and ~1.5 wt% Cu-loaded TiO_2 composite (CuMTA-3) catalysts.

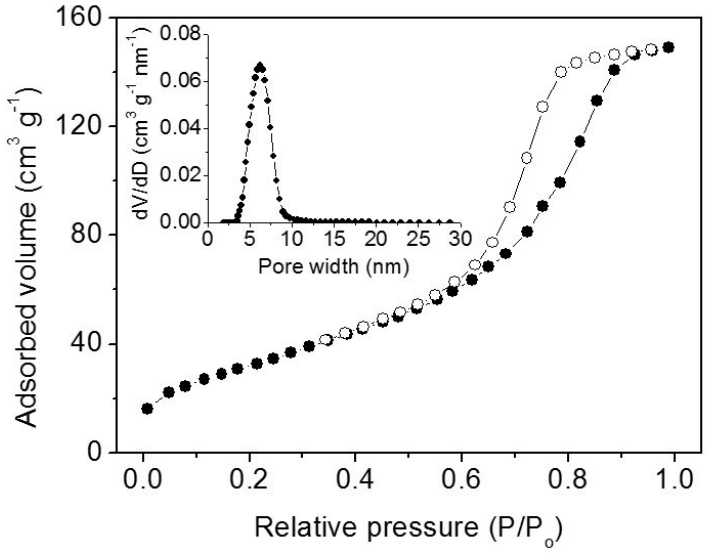

Fig. S9 Nitrogen adsorption–desorption isotherms at 77 K and the corresponding NLDFT pore-size distribution (inset) of the CuMTA-3*P* material.

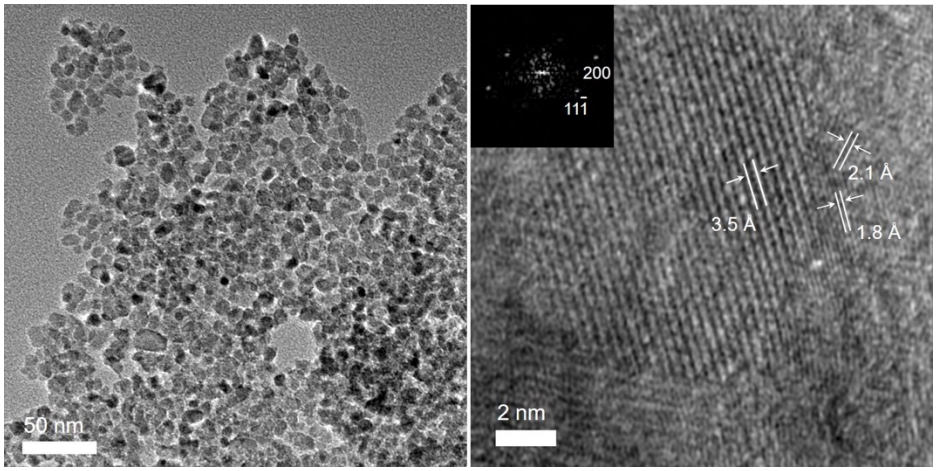

Fig. S10 Typical TEM image (left) and HRTEM (right) for mesoporous CuMTA-3*P* catalyst. The HRTEM image shows lattice fringes with *d* spacings of 3.5, 2.1 and 1.8 Å, which are assigned with the aid of FFT pattern (inset) to the (101) planes of anatase TiO_2 and (111) and (200) planes (along the [011] zone axis) of face-centered cubic Cu, respectively.

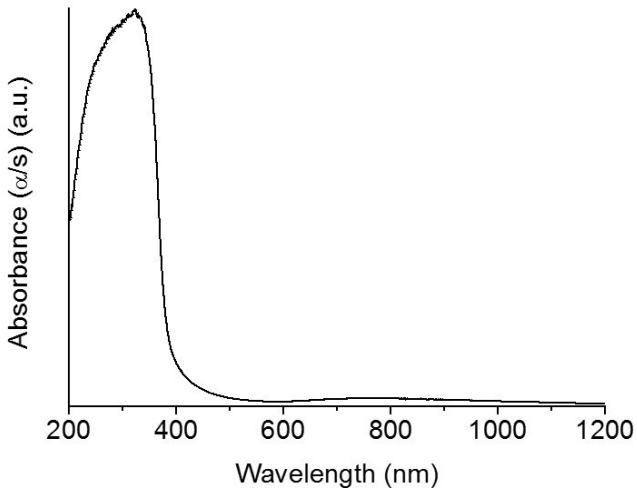

Fig. S11 UV–vis/NIR absorption spectrum, transformed from the diffuse reflection data according to the Kubelka-Munk method, of the CuMTA-3*P* catalyst.