



Supplementary Materials

Hydrogenated Amorphous Titania with Engineered Surface Oxygen Vacancy for Efficient Formaldehyde and Dye Removals under Visible-Light Irradiation

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S1. Results and Discussion

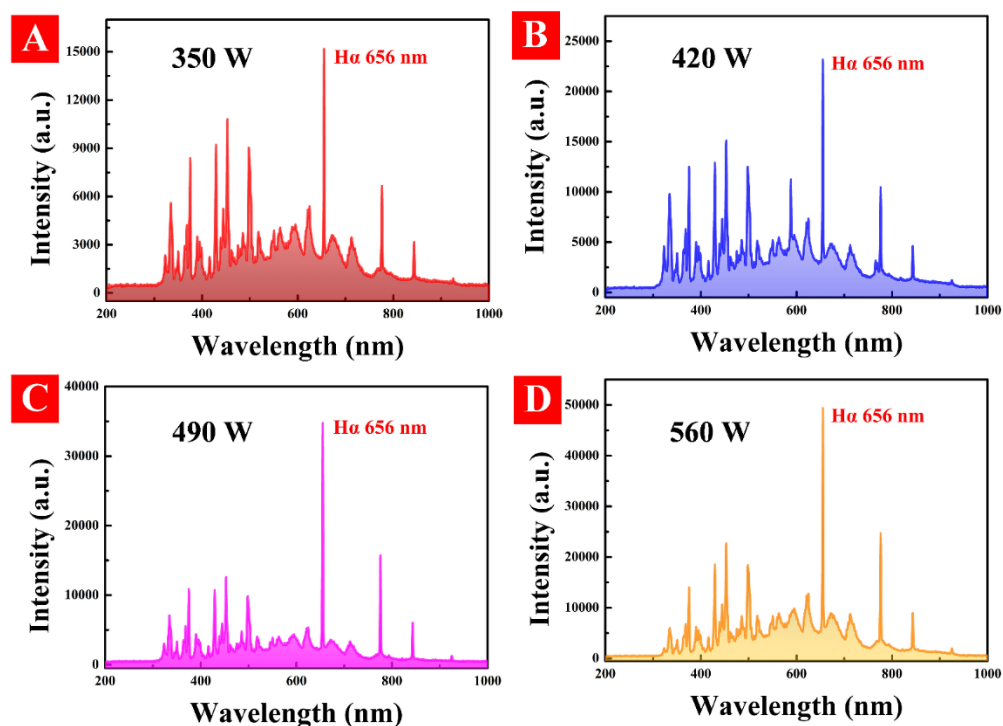


Figure S1. The emission spectrum of liquid plasma with different output power, (A), (B), (C), and (D) are obtained by applying the output power of 350, 420, 490, and 560 W, respectively.

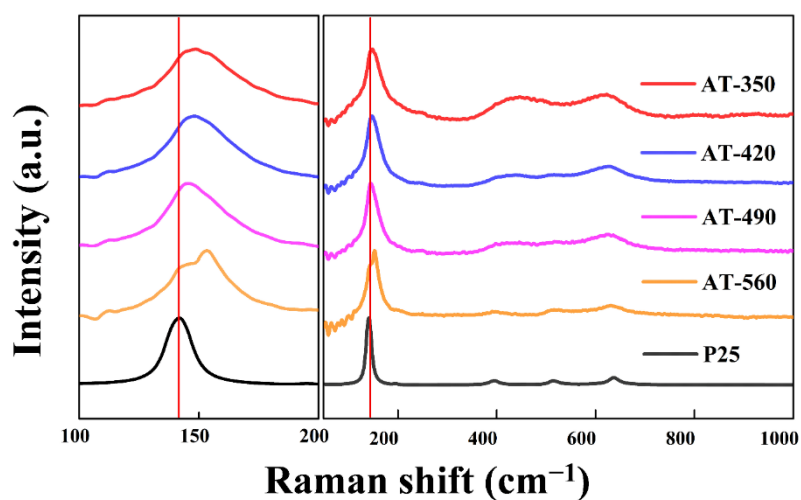


Figure S2. Raman spectra of all HAM-TiO_{2-x} samples.

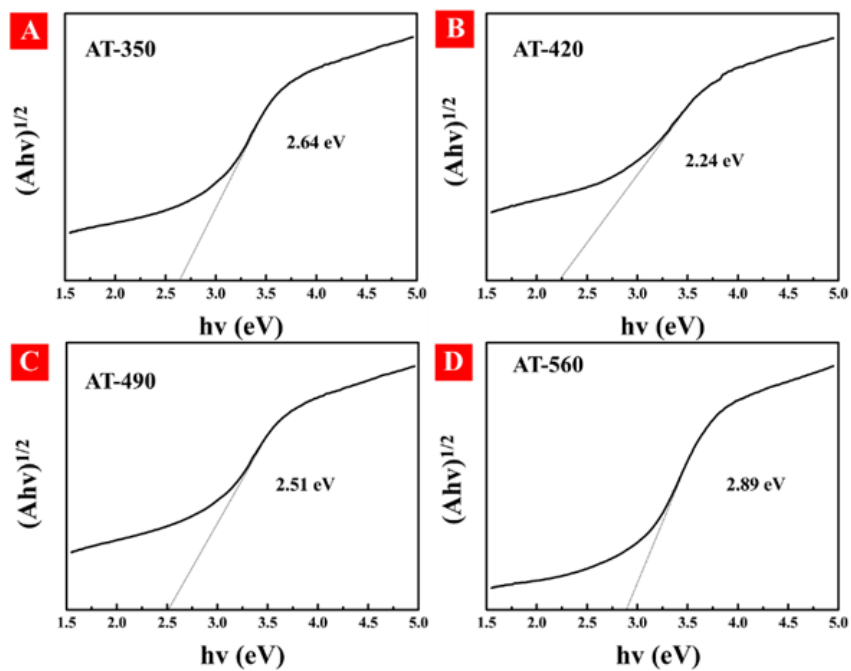


Figure S3. (A), (B), (C) and (D) were the Kubelka Munk graphs of AT-350 (2.64 eV), AT-420 (2.24 eV), AT-490 (2.51 eV), and AT-560 (2.89 eV), respectively.

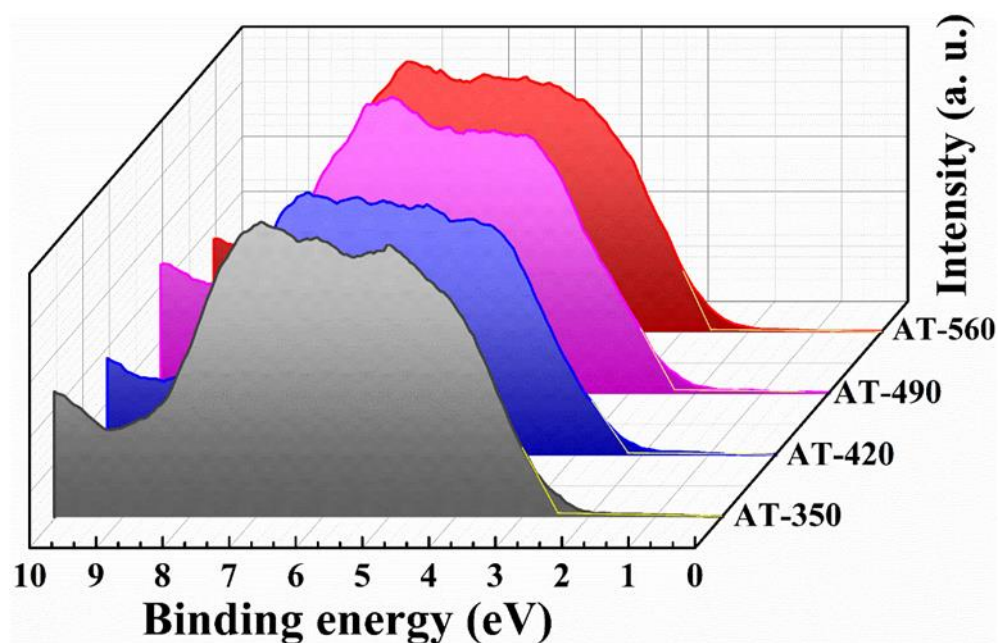


Figure S4. X-ray photoelectron spectroscopy valence band spectra of all samples.

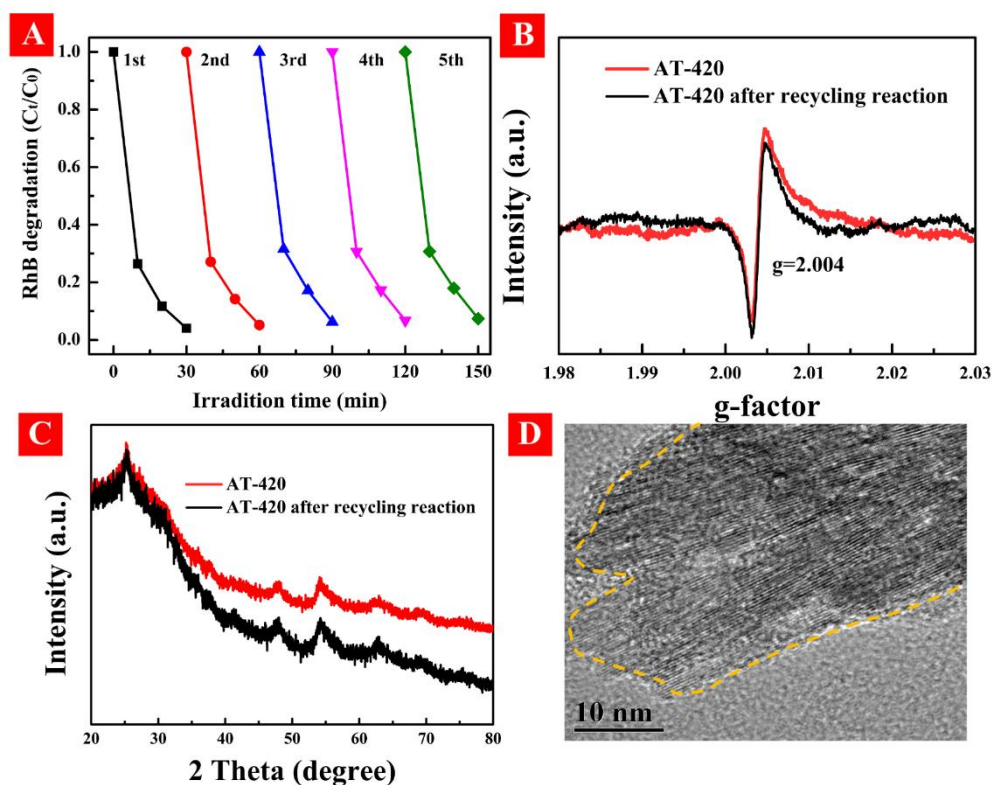


Figure S5. (A) The recycling experimental of RhB using AT-420 under visible light. (B) and (C) were EPR and XRD data for AT-420 and catalyst after recycling reaction, respectively. (D) High resolution TEM image of AT-420 after recycling reaction, and the disordered surface was marked with yellow dashed line.

As shown in Figure S5A, no obvious decline was observed after 5-times recycling reaction. Meanwhile, the XRD, TEM and EPR data after recycling reaction were also provided. As shown in Figure S5B, the surface O_v ($g = 2.004$) is still observed in HAm-TiO_{2-x}, and the crystal structure remains unchanged and is still amorphous phase shown in Figure S5C. The high resolution TEM of AT-420 after recycling reaction was seen in Figure

S5D, the disordered surface marked with yellow dashed line is presented which suggests that the existence of O_v defects, and was also consistent with EPR data in Figure S5B. Therefore, the stability of surface O_v of HAM-TiO_{2-x} accounted for its stable recycling photodegradation.

Table S1. The amount of $\cdot O_2^-$ and $\cdot OH$ by employing of 5,5-dimethyl-1-pyrroline-*N*-oxide (DMPO) to in-situ trap the spin-reactive species.

Sample	Spins / mm ³	M	Spins
$\cdot OH$	2.653×10^{12}	4.405×10^{-6}	5.834×10^{13}
$\cdot O_2^-$	1.4×10^{13}	2.341×10^{-5}	3.1×10^{14}

Notes: "Spins / mm³" is the number of spins per unit volume, "M" is the molarity, and "spins" is the total number of spins, and thus the free radicals can be estimated with spins/mm³.