Supplementary Information (SI) for Nanoscale.

Facile Phase Selective Synthesis of α- and β-$AgVO_3$: Comparative Structural, Morphological and Photocatalytic Performance

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Supplementary material

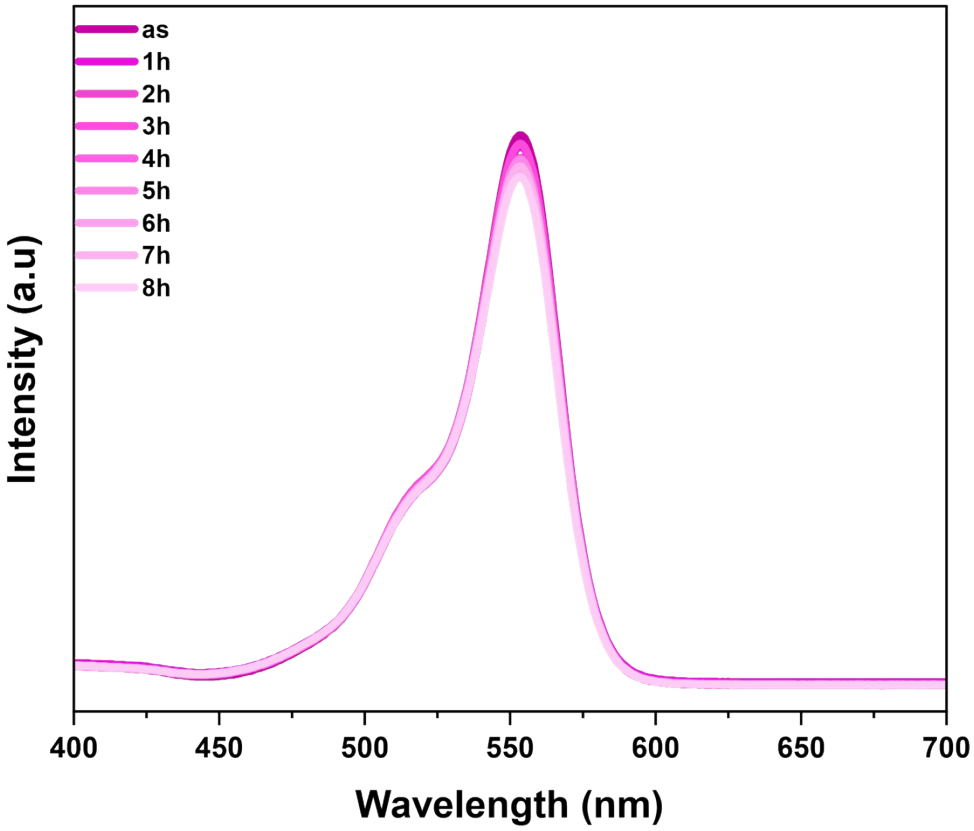

Figure S1. Rhodamine B degradation under light illumination without photocatalyst

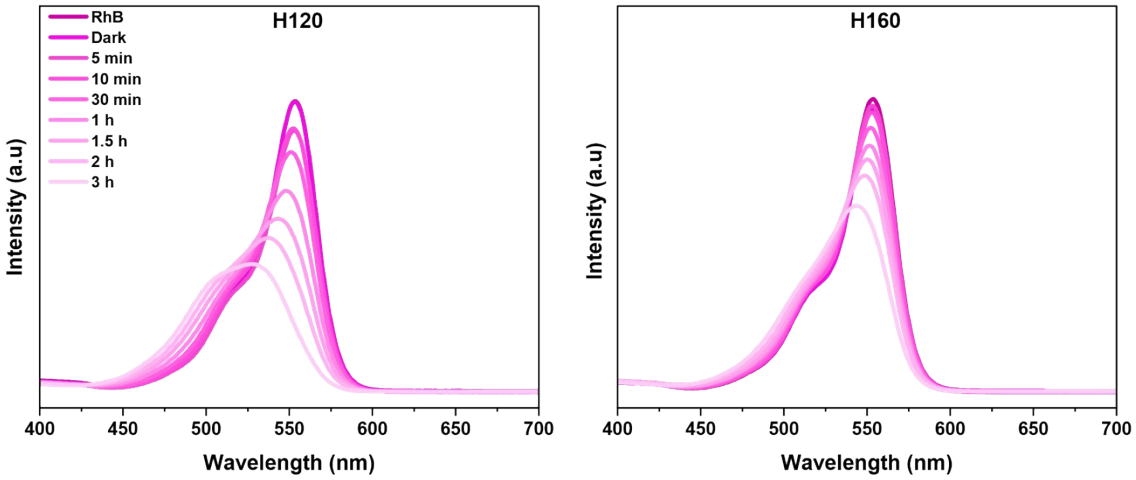

Figure S2. UV–Visible absorption spectra of Rhodamine B at different time intervals under visible light irradiation using (a) H120, (b) H160, (a) and (b) have same time intervals.

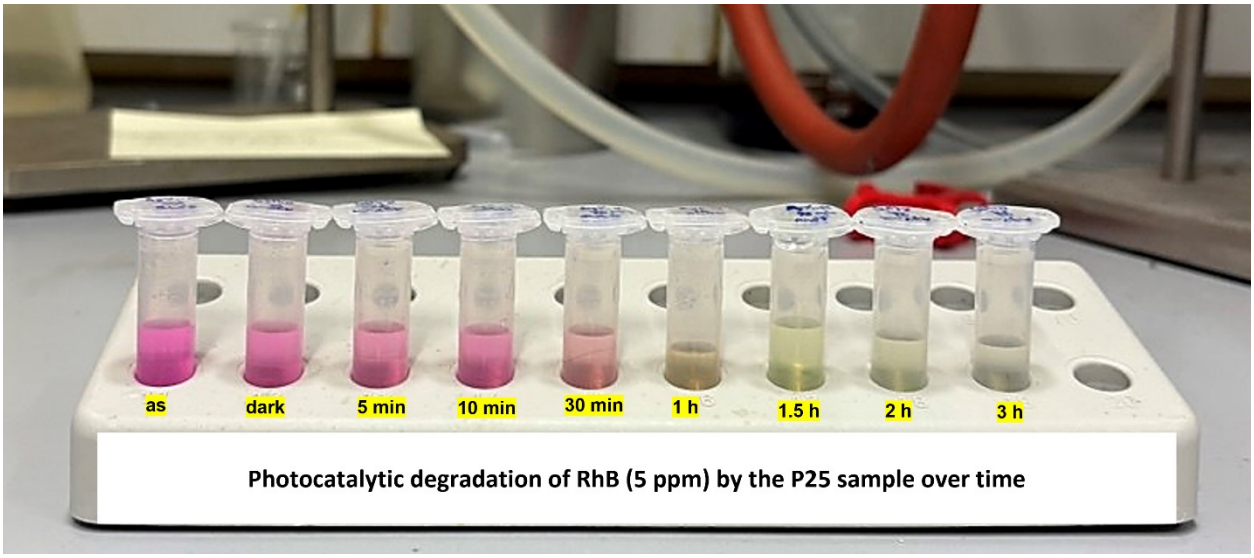

Figure S3. Photocatalytic degradation of RhB (5 ppm) over time using P25 sample as the photocatalyst

Table S1. XPS spectra for Ag, V, and O elements for P25 sample

	Source energy: 1486.6 eV	Source energy: 1486.6 eV	Source energy: 1486.6 eV	Source energy: 1486.6 eV
Name	**Position (eV)**	**FWHM (eV)**	**Area (CPS eV)**	**LS**
V5+2p3	517.07	0.8	1480.12	LA(5)
V5+2p1	524.55	2.06	1113.28	LA(5)
O 1s	530.17	1.02	2250.79	LA(50)
V	517.45	1.68	1456.84	LA(50)
V	515.98	0.75	64.97	LA(50)

O 1s	530.59	1.25	1684.67	LA(50)
V	522.46	1.58	116.89	LA(50)
O 1s	532.95	1.21	91.44	LA(50)
Ag 3d	368.22	1.35	10198.42	LA(1,643)
Ag 3d	374.22	1.35	7041.99	LA(1,643)
C 1s	284.72	1.34	44.28	LA(50)

Table S2.XPS spectra for Ag, V, and O elements for H140 sample

	Source energy: 1486.6 eV	Source energy: 1486.6 eV	Source energy: 1486.6 eV	Source energy: 1486.6 eV
Name	**Position (eV)**	**FWHM (eV)**	**Area (CPS eV)**	**LS**
V5+2p3	517.07	0.8	1480.12	LA(5)
V5+2p1	524.55	2.06	1113.28	LA(5)
O 1s	530.17	1.02	2250.79	LA(50)
V	517.45	1.68	1456.84	LA(50)
V	515.98	0.75	64.97	LA(50)
O 1s	530.59	1.25	1684.67	LA(50)
V	522.46	1.58	116.89	LA(50)
O 1s	532.95	1.21	91.44	LA(50)
Ag 3d	368.22	1.35	10198.42	LA(1,643)
Ag 3d	374.22	1.35	7041.99	LA(1,643)
C 1s	284.72	1.34	44.28	LA(50)

Table S3. XPS spectra for Ag, V, and O elements for P25 after photocatalysis sample

	Source energy: 1486.6 eV	Source energy: 1486.6 eV	Source energy: 1486.6 eV	Source energy: 1486.c6 eV
Name	**Position (eV)**	**FWHM (eV)**	**Area (CPS eV)**	**LS**
V5+2p3	517.07	0.8	1480.12	LA(5)
V5+2p1	524.55	2.06	1113.28	LA(5)
O 1s	530.17	1.02	2250.79	LA(50)
V	517.45	1.68	1456.84	LA(50)
V	515.98	0.75	64.97	LA(50)
O 1s	530.59	1.25	1684.67	LA(50)
V	522.46	1.58	116.89	LA(50)
O 1s	532.95	1.21	91.44	LA(50)
Ag 3d	368.22	1.35	10198.42	LA(1,643)
Ag 3d	374.22	1.35	7041.99	LA(1,643)
C 1s	284.72	1.34	44.28	LA(50)

Work function measurement:

Atomic Force Microscopy (AFM) and Kelvin Probe Force Microscopy (KPFM) measurements are performed by using an Ntegra scanning probe microscope (NT-MDT, Russia). The sample surface was first cleaned with a nitrogen blower to remove the surface contaminants. The measurements are performed in a nitrogen filled glovebox at room temperature. KPFM measurements are conducted in amplitude modulation mode using Pt-coated conductive tip probes (Multi75-EG, BudgetSensors, USA). The work function of the sample is estimated by mapping the contact potential difference (CPD) between the tip and the surface of the sample. CPD is the difference of the work functions between the sample and the tip, as represented in the equation S1:[1]

$$V_{CPD} = \frac{\varphi_{tip} - \varphi_{sample}}{-e} \quad \text{(S1)}$$

Where φ_{sample} and φ_{tip} are the work functions of the surface of the sample and the tip, respectively. The work function of the Pt coated tip was calibrated with highly oriented pyrolytic graphite (HOPG) and the work function of HOPG was taken as 4.48eV.[2, 3] The absolute work function of the samples is calculated by equation S2:

$$\varphi_{sample} = \varphi_{HOPG} + e(CPD_{sample} - CPD_{HOPG}) \quad \text{(S2)}$$

The contact potential difference (CPD) from the surface potential (SP) maps of the P25 and H140 samples are estimated to be -0.8 eV and -0.76 eV respectively, whereas the CPD of the HIOPG (reference) was -0.07 eV as shown in Figure 7. Since the work function of HOPG (4.48 eV) is known the absolute work function of P25 and H140 was determined to be 3.75 eV and 3.79 eV.

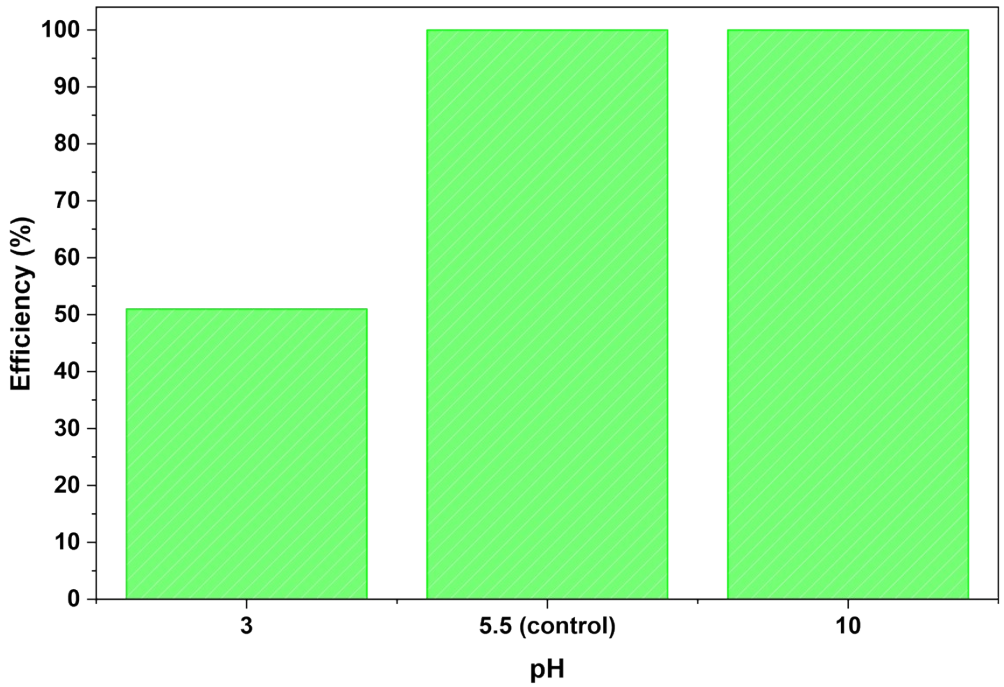

Figure S4. Efficiency of RhB degradation by the P25 sample at different pH values (RhB concentration: 5 mg. L^{-1}, Photocatalyst dosage: 1 g. L^{-1}, time: 3h)

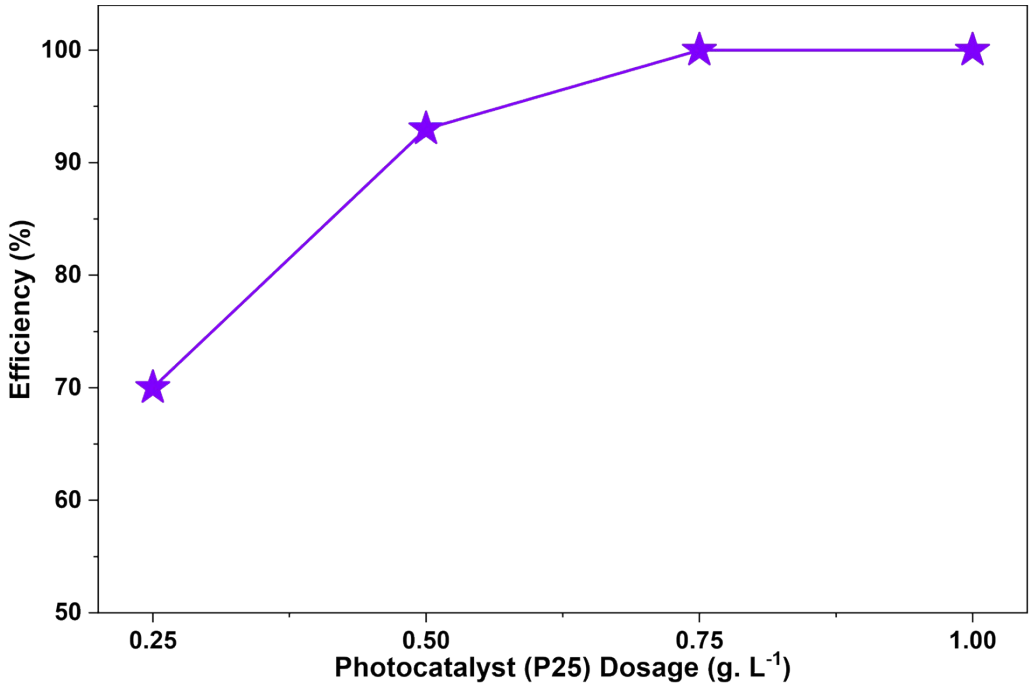

Figure S5. Efficiency of RhB degradation by the P25 sample at different photocatalyst dosages (RhB concentration: 5 mg. L^{-1}, time: 3h)

Table S4. Comparison of present study with key earlier studies employing $AgVO_3$ as the photocatalyst and RhB as the model dye)[a]

Material	dye concentration ($mg.\ L^{-1}$)	Photocatalyst dosage ($g.\ L^{-1}$)	Light source	Time (min)	Efficiency (%)	reference
α-$AgVO_3$	5	1	LED lamp, 300 W	90	100	Present study
β-$AgVO_3$	5	1	LED lamp, 300 W	180	89	Present study
α-$AgVO_3$	10	0.15	Xenon lamp, 300 W	180	33	[4]
β-$AgVO_3$	10	0.15	Xenon lamp, 300 W	180	56	[4]
$AgVO_3$	5	1	Tungsten halogen lamp, 250 W	90	29	[5]
$AgVO_3$	10	0.6	Xenon lamp, 300 W	80	10	[6]
$AgVO_3$	10	0.6	Xenon lamp, 800 W	150	10-20	[7]
α- $AgVO_3$	5	0.5	Xenon lamp, 300 W	40	10	[8]

a: In some of the reported literature, $AgVO_3$ is used in a heterojunction structure; however, in this table, only the performance of single-phase $AgVO_3$ is considered.

References:

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